FINAL
SOIL REMOVAL WORK PLAN
OPERABLE UNIT 2

AT
OAKLAND ARMY BASE
OAKLAND, CALIFORNIA

SACRAMENTO TERC II
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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

bgs	Below Ground Surface
BRAC	Base Realignment and Closure
BWSHP	Basewide Safety and Health Plan
CFR	Code of Federal Regulations
COC	Chemical of Concern
CQC	Contractor Quality Control
cy	Cubic Yards
4-4'-DDD	Dichloro-diphenyl-dichloroethane
4,4'-DDT	Dichloro-diphenyl-trichloroethane
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ft	Feet
ft/ft	Feet per feet
ft^3	Cubic feet
HHRA	Human Health Risk Assessment
ICF KE	ICF Kaiser Engineers, Inc.
IT	IT Corporation
µg/kg	Micrograms per Kilogram
mg/kg	Milligrams per Kilogram
msl	Mean Sea Level
OARB	Oakland Army Base
OU2	Operable Unit 2
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
RAW	Removal Action Workplan
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SVOC	Semivolatile Organic Compound
TERC	Total Environmental Restoration Contract
TPH-d	Total Petroleum Hydrocarbons as Diesel
TPH-mo	Total Petroleum Hydrocarbons as Motor Oil
UPRC	Union Pacific Railroad Company
USACE	U.S. Army Corps of Engineers
U.S.C.&G.S.	U.S. Coast and Geodetic Survey
VOC	Volatile Organic Compound
WP	Work Plan
YBM	Young Bay Mud

1.0 INTRODUCTION

This Work Plan (WP) was prepared by IT Corporation (IT) under the U.S. Army Corps of Engineers (USACE), Sacramento District, Total Environmental Restoration Contract (TERC) II, Contract No. DACW05-96-D-0011, for the removal of contaminated soil from within Operable Unit 2 (OU2), Oakland Army Base (OARB), California. The soil removal is being completed in accordance with the *Removal Action Work Plan for OU2 Soil at Oakland Army Base* (IT, 2000).

The *Final Remedial Investigation Report for OU2* (IT, 1999) concluded that both soil and groundwater within a limited area of OU2 have been impacted by historical site operations and may pose risks to human health and the environment that exceed acceptable levels. The localized area of elevated concentrations in soil is located adjacent to the boundary of OARB, in a low quality wetland within Union Pacific Railroad Company (UPRC) property (Figure 1-1). This soil is contaminated with pesticides, and petroleum hydrocarbons that originated within OU2.

A Removal Action Work Plan (RAW) (IT, 2000) was prepared that evaluated several removal alternatives and recommended excavation and off-site disposal of contaminated soils with concentrations above the accepted cleanup levels. The RAW addresses only the contaminated soil. Groundwater contamination within OU2 will be addressed separately in a feasibility study. The localized area of elevated concentrations identified in the RAW has been expanded to approximately 12,000 ft^2 based on the results of new sampling conducted in the area. As a result, the confirmation sampling strategy presented in the RAW has also been modified.

This WP describes the activities that will be conducted to implement the removal action. The plan includes a brief discussion of the site background, a summary of the chemicals of concern (COCs) found at the site, cleanup levels, a description of the methodologies to be used, and the confirmation testing that will be completed to verify the effectiveness of the removal action. A sampling and analysis plan (SAP) for this soil removal is provided in Appendix A. The project-specific contractor quality control (CQC) plan is provided in Appendix B. Health and safety procedures for the field activities are included in the basewide safety and health plan for OARB (ICF Kaiser Engineers [ICF KE], Inc., 1997). A Project-Specific Activity Hazard Analysis is included as Attachment 2 to this WP. A preliminary project schedule detailing the implementation of the removal action is included in Attachment 1.

1.1 SITE HISTORY

Originally commissioned in 1941 as a sub-port and depot of the San Francisco Port of Embarkation, OARB was intensely developed during World War II and served as a major cargo port during the war. Following the end of World War II, OARB continued its mission as a major shipping and rail terminal and provided key logistic support for the Korean War, the Vietnam War, and Operation Desert Shield/Storm. In June 1995, the Base Realignment and Closure (BRAC) Commission recommended OARB for closure and authorized the establishment of an Army Reserve Enclave on a small part of the Base to continue after its closure. The Base officially closed on September 30, 1999.

In an aerial photograph taken in 1918, the OU2 area appeared as tideland. Irregular drainage swales bounded by vegetation are visible in the photograph and it appears that approximately two to three feet of water was present in the OU2 area. Railroad trestles are visible north of the site on the 1918 photograph. A photograph taken in February 1941 shows the OU2 area filled in as a vacant lot, with no structures present. The Army began operations at the site in 1942. There are no records of site usage before the Army took ownership of the OU2 area.

1.2 SITE DESCRIPTION

Building 991, which served as a switch engine repair shop, was constructed in 1942. A concrete washrack used for rail cars is located south of Building 991 (Figure 1-2). A sump located in the center of the washrack is connected to a drain line that discharges into a low quality wetland owned by UPRC. Results of the OU2 remedial investigation (RI) indicate that the washrack was a source of pesticide contamination in the low quality wetland (IT, 1999). The area proposed for the removal action is an area surrounding the drain line discharge point within the low quality wetland and along the fence line at the eastern property line. This area is designated as the localized area of elevated concentrations on Figure 1-2.

Surface water flow at OU2 is toward the low quality wetland east of the site and toward a railroad trestle north of the site. Surface water entering these two areas either evaporates or infiltrates into the subsurface. Surface flow out of the low quality wetland does not appear to occur, i.e., it is a closed basin. A berm is present between the low quality wetland and the first railroad spur to the east. High ground is present north of the low quality wetland. The elevations of the berm and high ground are approximately equal to the elevations of the area east of Building 991. During site activities in early March 1998, surface water within the low quality wetland was still several feet from the top of the berm, even though the quantity of rainfall during January and February 1998 was the highest on record for Oakland (Western Regional Climate Center, 1999). It is highly unlikely that surface water could flow over the top of the berm, even during flood events. San Francisco Bay, located 2,400 ft to the northwest, is the nearest permanent surface water body.

Except for the low quality wetland, OU2 is underlain by gravelly fill from ground surface to a maximum depth of 7 feet (ft) below ground surface (bgs). The gravel fill is underlain by sand to a maximum depth of 15 feet bgs. Clay underlies the sand unit and is also present in thin, laterally discontinuous 1- to 2-ft thick lenses within the sand. In the low quality wetland, the sand unit is present at ground surface. Of the units encountered during drilling activities at OU2, the sand fill is the primary shallow groundwater-bearing zone. The young bay mud (YBM) underlying the sand unit provides a barrier to vertical groundwater flow.

The groundwater flow direction in OU2 is generally toward the north to northeast, although southern and northwestern flow directions have been observed. The groundwater gradient ranged from 0.02 to 0.0004 feet per feet (ft/ft). During the winter and spring rainy season the groundwater table intersects the ground surface in the low quality wetland. The ground surface elevations within the low quality wetland ranges from 3.72 to 5.33 ft above mean sea level (msl). Standing water is seasonally present in the low quality wetland.

The majority of the OU2 site is paved or developed, and wildlife habitat or endangered species are not expected to exist at OU2. The wetlands delineation report (Foster Wheeler, 1999) concluded that the wetland was "low quality" based on its small size, low species diversity, and the presence of numerous non-native plant species. Highly developed zones, such as freeways and the abandoned railroad trestle, surround the low quality wetland. A seasonal freshwater habitat is present in a small depression (approximately 0.5 acres) within the low quality wetland. The depression dries out between approximately June and October and is bisected by active railroad tracks. Vegetation communities identified in this area include wetlands transition ruderal, and upland ruderal. Abundant wetland vegetation, primarily cattails *(Thypha augustifolia)* and green algae *(Cladophora sp.),* were observed within the depression during an ecological survey. Grasses and forbs also were present on the margins of the depression, and upland ruderal areas were vegetated primarily by non-native grasses and forbs. Gravel, debris, and unvegetated soil are also characteristic of the upland ruderal areas. No special-status species are expected to inhabit the low quality wetland on a regular basis due to the limited extent of forage and cover.

1.3 PREVIOUS INVESTIGATIONS

During a Remedial Investigation (RI) completed in 1999, groundwater, surface soil, and subsurface soil samples were collected and analyzed. The data from this sampling event are presented in the *Final Remedial Investigation Report for OU2* (IT, 1999). Additional soil samples were also collected in May and July, 2000 to further delineate the localized area of elevated concentrations in preparation for this soil removal. This section summarizes the results of the RI and additional sampling for the low quality wetland.

Soil samples collected from the low quality wetland were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), herbicides, metals, and petroleum hydrocarbons. The results of the human health risk assessment (HHRA) presented in the RI indicate that the risk driving chemicals in the low quality wetland are dieldrin and aldrin detected within the localized area of elevated concentrations. Risk-based cleanup levels were developed and presented in the RAW for dieldrin, aldrin, 4,4'-DDD, 4,4'-DDT, chlordane, 4,4'-DDE total petroleum hydrocarbons as motor oil (TPH-mo), and TPH as diesel (TPH-d). Analytical data for these compounds and petroleum hydrocarbon mixtures are presented in Table 1-1 for samples collected in the localized area of elevated concentrations. Sample locations are shown on Figure 1-2. Cleanup levels are presented in Table 1-2.

The highest concentrations of pesticides in soils were measured in samples collected within approximately 30 ft of the washrack drain pipe discharge point and along the fence line west of the low quality wetland. Maximum concentrations of pesticides detected in OU2 soil include aldrin at 29,200 micrograms per kilogram (µg/kg) between the washrack and drain pipe discharge at 2.75 ft bgs, and dieldrin at 80,000 µg/kg 10 ft south of the washrack drain pipe at groundsurface. Maximum concentrations of 4,4'-DDD at 23,000 µg/kg and 4,4'-DDT at 19,000 µg/kg were detected in surface soil 30 ft northeast of the drain pipe discharge. The sampling conducted during May and July, 2000 indicated that pesticides probably were released along the fence line. The vertical extent of the pesticide-affected soils has not been delineated. However, in samples collected in the low quality wetland (ITU2S52, ITU2S36, ICFU2S14, ITU2S40, and ITU2S41), pesticides were detected above cleanup levels at a maximum depth of 0.5 ft bgs. Along the bank west of the low quality wetland, pesticides were detected above cleanup levels at a maximum depth of 2.75 ft bgs.

The greatest concentrations of TPH detected in OU2 were in samples collected from the vicinity of the washrack drain pipe discharge. TPH-d was detected at 20,900 mg/kg at 2 ft bgs.

Lead was detected in the localized area of elevated concentrations at concentrations above the OARB ambient level of 50.9 mg/kg. The shallow soil samples collected at the outfall of the drainpipe from the washrack contained lead concentrations above the ambient lead level. Lead was detected at a maximum concentration of 300 mg/kg in surface soil sample KHA2.

1.4 REMOVAL ACTION OBJECTIVES

Contaminated soil within the localized area of elevated concentrations will be remediated in accordance with the RAW. Samples will be collected from the excavation bottom and sidewalls for chemical analysis. The analytical results will be compared to the cleanup levels that were developed in the RAW. The COCs and their soil cleanup levels are presented in Table 1-2. To remove the potential source that is contributing to the soil contamination, any sediment or soil in the washrack sump and drain piping will be removed and the piping will be removed east of the washrack. The sump and remaining piping will be grouted in place.

The area to be excavated has been identified as the localized area of elevated concentrations (designated the Hotspot area in the Final RI Report), as shown in Figure 1-2. The soils will be excavated to a depth of approximately 3 ft bgs along the bank west of the low quality wetland and 1 ft bgs within the low quality wetland. The volume of soil to be excavated is estimated to be 20,000 cubic feet (ft^3).

Pre-excavation, and confirmatory, sampling and analysis will be conducted at the extent of the excavation to ensure that the cleanup levels are met, as shown in Figures 1-3 and 2-1.

2.0 DESCRIPTION OF WORK

The following sections provide a description of the activities that will be completed as part of the removal action. The activities include preconstruction preparation, sample collection and analysis, cleaning and grouting of the drain pipe, excavation, shoring and sloping, equipment decontamination, waste management, and site restoration.

2.1 PRECONSTRUCTION ACTIVITIES

Preconstruction activities involve obtaining required permits, establishing an exclusion zone, and inspecting for underground utilities. The following sections describe the activities that will be performed in preparation for the removal action work.

2.1.1 Permitting and Notification

Permits required for the proposed activities will be obtained prior to the start of the field work. The USACE, OARB, Department of Toxic Substances Control (DTSC), and UPRC will be notified prior to mobilization of equipment and personnel to the site. An application has been submitted to the UPRC for environmental cleanup and access to the site. Permission to complete the planned activities will be received from UPRC before mobilization to the site.

2.1.2 Site Security

An exclusion zone will be established around the localized area of elevated concentrations. The fence that currently surrounds the area will be used to delineate the exclusion zone. The exclusion zone will be extended by using temporary fencing to encompass excavation activities and waste storage. Only IT personnel, approved subcontractors, and authorized visitors who have completed 40 hours of training per Title 29, Code of Federal Regulations (CFR) § 1910.120 (29 CFR 1910.120) and are equipped with the required personal protective equipment (PPE) will be allowed to enter the exclusion zone.

A section of fencing will be removed to facilitate heavy equipment egress. The missing section will be delineated with temporary security fencing overnight.

2.1.3 Site Safety and Health

An Activity Hazard Analysis is provided in Attachment 2. All work will be conducted in accordance with the Basewide Safety and Health Plan (ICF KE, 1997), and the Activity Hazard Analysis.

2.1.4 Identification and Avoidance of Utilities

Underground Services Alert will be notified at least 48 hours prior to the start of intrusive activities. UPRC will also be contacted, as specified in the access agreement, to determine if fiber optic cable is buried in the vicinity of the proposed excavation.

2.2 SOIL SAMPLE COLLECTION

The following presents the process and procedures that will be followed in soil sample collection. The sampling rationale is based on an evaluation of the data quality objectives as presented in the SAP.

Details of the sampling procedures, analytical requirements, and quality control sampling and analysis are included in the SAP.

2.2.1 Pre-Excavation Samples

Samples at approximately 40 locations will be collected and analyzed to determine the extent of contamination above cleanup levels prior to any excavation work. This will allow for collection of intact samples that represent the contaminant concentrations at the final excavation extent prior to disturbing the soil. Based on historical information, the soil at the bottom of the planned excavation will likely be saturated with groundwater at the time of excavation (see Figure 1-3).

The confirmation soil sampling strategy is described below. Initial sample locations are shown on Figure 1-3. Figure 2-2 presents the decision guidance that will be followed for soil sampling and excavation.

2.2.1.1 Pre-Excavation Bottom Samples

The vertical extent of the pesticide contamination is not confirmed on the west side of the wetland along the fence line, nor at a 20 foot radius around the end of the sump pipe discharge end. The four bottom samples to be taken around the 20 foot radius of the pipe end will be taken at a depth of 3 feet bgs. The 12 bottom samples along the boundaries will be taken at a depth equivalent to 1 foot bgs in the wetland.

If the concentration of any COC exceeds the cleanup level in an excavation bottom sample, then an additional deeper sample will be collected and analyzed until cleanup levels are met for all COCs (pesticides and TPH). Sample depths may be adjusted based on field conditions.

2.2.1.2 Pre-Excavation Boundary Samples

Existing analytical data from soil samples collected about every 20 feet define the approximate boundaries of the planned initial excavation boundary (Figure 1-2). To define the horizontal extent of contamination above COCs, pre-excavation soil samples will be collected at a depth of 0.5 feet bgs at the locations shown on Figure 1-3.

If the concentration of any COC exceeds the cleanup level in a pre-excavation horizontal extent sample, then the grid will be extended an additional 5 ft and an additional sample will be collected and analyzed. An excavation bottom sample will also be collected at the sample location where cleanup levels were exceeded.

Soil sample locations will be surveyed by the sampling crew prior to the beginning of excavation. Measurements will be taken from existing monitoring wells or features located on the figures which have been surveyed using the following procedure. The survey will be tied into the established U.S. Coast and Geodetic Survey (U.S.C.&G.S.) benchmarks. An established U.S.C.&G.S. benchmark designated 4847 BB 16 (SFBARTD) is located at the intersection of 7th Street and Maritime Street. The survey data will be provided in the California Coordinate System NAD27 (CCS27) Zone 3 coordinates.

2.2.2 Confirmation Samples

Subsequent to the soil excavation, confirmatory samples will be collected along the excavation bottom and sidewalls. The excavation bottom samples will be collected on a 40x50 foot grid. Sidewall samples will be collected every 40 feet. There will be approximately 20 confirmation samples collected. The samples will be analyzed for pesticides and TPH, which are the contaminants of concern for this removal action. Figure 2-1 and Table 4-2 present the estimated locations and number of post-excavation confirmation samples to be taken. Although the area of excavation is not expected to change, grids will be added for additional confirmation samples if changes in the size of the excavation do occur.

The samples will be analyzed for pesticides (EPA Method 8081), and extractable petroleum hydrocarbons (EPA Method 8015B).

2.3 CLEANING AND GROUTING WASHRACK AND SUMP; AND, PIPING REMOVAL

The sump and associated 5-inch drain pipe leading from the concrete washrack near Building 991 to the edge of the low quality wetland within the localized area of elevated concentrations could potentially provide a pathway for further impact to the site from its current contents or from future activities at the site. This pipe will be cleaned and removed east of the wash rack. The pipe remaining underneath the wash rack and the sump will be filled with grout.

Any soil, sediment, or debris in the pipe and sump will be removed and consolidated into 55-gallon drums and will be added to the waste soil for disposal. Once clear of debris, the pipe and sump will be rinsed with clean water. Wastewater generated from rinsing the pipe will be collected in 55-gallon drums and will be added to other wastewater generated from other planned activities for disposal. The pipe east of the wash rack will be removed during soil excavation. The low end of the remaining pipe will be plugged and the pipe and sump will be filled with a grout slurry. The slurry will be added slowly at the sump to avoid bridging the grout and creating air pockets in the pipe. The grout will be allowed to fully cure before the plug is removed. If the grout settles in the sump, additional grout will be added to bring the level up to the level of the top of the sump.

2.4 SITE PREPARATION

Prior to excavation, the surface will be cleared of vegetation. Special care will be taken to minimize disturbing the low quality wetland any more than required to remove the contaminated soil. The excavation extent, developed during the pre-excavation sampling, will be marked out on the ground to define the horizontal extent and guide excavation activities. Soil will be excavated from areas where the sample results indicated that the concentrations are above cleanup levels. Each grid square will be excavated to the depth of the sample with concentrations below the cleanup levels.

2.5 EXCAVATION

The soil will be excavated using an excavator, backhoe, and/or front-end loader, based on the configuration of the excavation and the site access. The soil will be transferred to a temporary stockpile area near Building 991 for consolidation and disposal profiling prior to being transported to the disposal facility. The soil will be placed in a bermed cell that is lined with minimum 30 mil polyethylene sheeting. The cell will be large enough to hold all of the soil generated from the excavation and will be designed so that water draining from saturated soil can be collected and transferred into holding tanks or drums. The soil in the cells will be covered at the end of each work day to minimize contact and spread of contamination. Dust suppression measures will be taken, including wetting traffic routes and soil stockpiles, to minimize the spread of contaminated soil. Airborne migration of the contaminants during excavation and shipment is not expected due to the wetness of the soil, but if drying does occur, it will be controlled with normal dust suppression measures. These measures include watering the remedial soil pile during the removal and loading actions using a fine mist spray from a fire hose connected to the adjacent fire hydrant. Care will be taken to prevent the accumulation of any additional wastewater. No volatile organic compounds or other chemicals of concern are expected to be released into the air; therefore, ambient air samples will not be collected during the removal action. Construction equipment used on the job will be equipped with standard noise suppression gear that is in good working condition. Work on the site will be limited to the hours of 7 am to 7 pm Monday through Friday, and 8 am to 5 pm on Saturday or Sunday. City of Oakland Noise level requirements as specified in code 17.120.050 of the Planning Code will be complied with during the excavation and loading portions of the work.

2.6 SHORING AND SLOPING

The excavation is not anticipated to extend below 3 ft in depth. Sloping will only be conducted to stabilize the excavation walls. If analysis of samples collected prior to the start of excavation indicate that excavation deeper than 4 ft is required to remove contaminated soil, the excavation activities will be evaluated to determine the requirements for shoring and sloping. Factors to be considered would include soil type, groundwater level, and overall depth. If necessary, a design for shoring, sloping, and/or dewatering will be prepared and submitted as an addendum to this plan.

2.7 DECONTAMINATION

A decontamination area for heavy equipment will be set up at the boundary of the exclusion zone. The decontamination area will include a polypropylene lined, bermed cell with a sump for water collection. A fresh-water source and wastewater accumulation tank will be located near the decontamination area.

Heavy equipment, including excavators and front-end loaders will be decontaminated when they leave the exclusion zone in accordance with IT Standard Operating Procedure (SOP) 6.2. As necessary, personnel that exit the exclusion zone will be decontaminated in accordance with the Basewide Safety and Health Plan (ICF KE, 1997).

A small decontamination area will be set up prior to the start of the pre-excavation sampling event. All sampling equipment that comes in direct contact with sampled soil, including core samplers and sleeves, will be thoroughly decontaminated in accordance with IT SOP 6.1 unless disposable, single-use equipment is used.

All wastes collected from decontamination activities will be disposed of as described in Section 2.9. At the end of each work day the wastes from decontamination will be stored in the designated storage areas until final disposal.

2.8 SITE RESTORATION

Following excavation and confirmation sampling and analysis activities as described in Section 2.2, the excavated portion of the low quality wetland will then be backfilled with sand to 8 inches below original groundsurface. Compacted topsoil will then be placed above the sand to original grade and seeded to prevent erosion. Existing vegetation will be allowed to take over the area naturally. West of the low quality wetland, a geotextile will be placed in the bottom of the excavation and the excavation will be backfilled with self-compacting pea gravel up to 1 ft above the level of the water table. A geotextile will then be placed over the pea gravel. Imported aggregate baserock will then be placed in the excavation in 8-inch lifts and compacted to 90 percent of maximum dry density. Field testing will be conducted to ensure that compaction requirements are met.

When field activities are completed, the decontamination areas will be removed, and the area will be restored as much as possible to the original conditions. Any fencing sections removed during activity will be restored to meet or exceed pre-existing conditions. Any waste generated during the project will be disposed of properly as described in Section 2.9.

2.9 WASTE MANAGEMENT

All wastes generated from the proposed activities will be sampled as necessary, characterized to provide information for profiling, and disposed of at facilities that are approved to accept the waste. The following sections provide the waste management procedures.

2.9.1 Waste Soil

Title 40 of the Code of Federal Regulations § 261.33 (40 CFR 261.33) defines discarded commercial chemical products, off-specification species, container residues, and spill residue thereof as toxic wastes and pesticides that are included as "U" coded wastes. However, the pesticide-contaminated soil in the low quality wetland is presumed to have been impacted by normal use of pesticides for operations and maintenance of the facility, not by spills of pure pesticide products. These soils will therefore not be listed wastes and will be disposed of depending on the individual pesticide concentrations and the disposal facility requirements.

Stockpiled soil will be sampled for waste disposal characterization at the frequency required by the proposed disposal facility. The samples will be analyzed for the analytes and parameters and by the methods required by the disposal facility. The sampling procedures are presented in the SAP. Previously obtained analytical results, including results from pre-excavation sampling and analysis, will be used to the extent possible in characterizing the wastes.

Once characterized and profiled for disposal, the soil will be transferred to bulk carriers for transportation to an off-site licensed disposal facility, the carriers will be owned and operated by a transporter that is licensed and permitted to transport the waste. The waste soil and polyethylene sheeting will be transported under bill-of-lading or manifest, which will be signed by the generator, transporter, and disposal facility. It is estimated that the approximately 750 cubic yards (cy) of waste soil will be transported offsite by 30 trucks carrying 25 cy each.

2.9.2 Wastewater

Wastewater generated from decontamination activities and dewatering of stockpiled soil will be stored in 55-gallon drums or polyethylene tanks. Decontamination water and wastewater generated from stockpiled soil will be segregated. The containers will be clearly labeled to indicate specific source, type of material, date of containerization, IT project contact, IT telephone number, and IT project number. The water will be characterized for disposal as required by the proposed disposal facility. If necessary, the water will be transported off-site for treatment/disposal once permission has been received from the disposal facility and the generator.

A wastewater storage tank will be mobilized to the site for any wastewater that is generated from the excavation activities. The tank will be placed within a lined and bermed cell to contain any potential spills. A pump will be used to transfer the water from the stockpile cell or excavation to the tank. Wastewater generated from decontamination and sampling activities will be kept separate from the de-watering wastewater, and stored in 55-gallon drums on pallets in a lined and bermed cell. During and following excavation activities, the stockpile cells will be periodically inspected and any water that separates from the soil within the cells will be pumped off to the wastewater storage tank.

As needed, standing water from the excavation site will be removed by pumping to the wastewater storage tank. A temporary dike will be constructed to prevent intrusion of surface water from outside the excavation area. If it becomes necessary to de-water the excavation area, the water will be pumped to the wastewater storage tank.

2.9.3 Miscellaneous Debris

Miscellaneous waste, such as construction debris and general trash, will be stored in dumpsters or rolloff bins. This material will be disposed of as non-hazardous waste at a generator-approved landfill. If the rinsate water sample collected from the cleaned piping verifies that the piping is non-hazardous, the piping will be disposed of as miscellaneous debris waste.

3.0 SOIL REMOVAL REPORTING

Following the completion of field activities and the receipt of final analytical data, a construction report will be prepared and submitted to the USACE. Following incorporation of USACE comments, the construction report will be submitted to regulatory agencies for review. A final construction report will be submitted following the incorporation of agency comments. The report will include a description of field activities, drawings of final excavation extent and sample collection locations, results of analytical testing, and results of waste management. A Quality Control Summary Report will also be completed discussing the results of the field and laboratory quality control testing.

4.0 REFERENCES

Foster Wheeler, 1999. *Wetland Delineation, Southern Pacific Desert Railyard Adjacent to Building 991 at Oakland Army Base, Oakland, California*. August.

ICF Kaiser Engineers, Inc. (ICF KE), 1997. *Basewide Safety and Health Plan for Oakland Army Base, Oakland, California*. November 3.

IT Corporation (IT), 1999. *Final Remedial Investigation Report for OU2 Remedial Investigation, Oakland Army Base, Oakland, California*. October 15.

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TABLES

Table 1-1: Chemicals of Concern Detected in Soil from Localized Area of Elevated Concentrations

Location	Date	Depth, ft. bgs	Aldrin ug/kg	Dieldrin ug/kg	4,4'DDD ug/kg	4,4'DDT ug/kg	Lead mg/kg	TPH-d mg/kg	TPH-mo mg/kg
KHA1	4/8/96	0	<54.5	1520	221	<106	278	10600	---
KHA1	4/8/96	2	26100	51900	1770 J	<3670	12.2	242	---
KHA2	4/8/96	0	<63.7	743	<124	<124	300	20900	---
KHA2	4/8/96	2	25200	28500	1090 J	<1780	11.1	621	---
KSB6	2/28/96	2.75	29200	26200 D	2300	<2150	---	45	---
ICFU2S10	3/2/98	3	36	10 J	1 J	<22	---	33	60
ICFU2S11	8/5/98	0.5	<1100	27000	6300	4100 J	---	1300	3100
ICFU2S11	8/5/98	2	<1100	12000	15000	1900 J	---	2200	3600
ICFU2S11 (Dup)	8/5/98	2	<210	4100	3600	<420	---	790	1900
ICFU2S12	8/5/98	0.5	<410	7400	2900	1100 J	25	760	1800
ICFU2S12	8/5/98	1.5	39 J	2800	2000	140 J	10	320	710
ICFU2S12 (Dup)	8/5/98	1	130 J	21000	7000	3000 J	160	650	1300
ICFU2S13	8/5/98	0.5	810 J	80000	<5200	<5200	---	64	28
ICFU2S13	8/5/98	2	12 J	1300 J	<110	<110	---	3.9 J	<11
ICFU2S14	8/6/98	0.5	<120	6600	23000	19000 J	---	4.9 J	18
ICFU2S14	8/6/98	1.5	4.7 J	34 J	3	7.1 J	---	2 J	3.8 J
ICFU2S15	8/6/98	0.5	1.8	2.3 J	3.8	0.65 J	4.2	2.3 J	3.1 J
ICFU2S15	8/6/98	1.5	0.93 J	6.3	19	2.3 J	2.7	3 J	5.6 J
ICFU2S16	8/6/98	0.5	0.41 J	0.2 J	5.8	<2.4	---	3 J	3.8 J
ICFU2S16	8/6/98	1.4	1.6 J	14	73	35 J	---	2.8 J	3.5 J
ICFU2S18	8/6/98	0.5	<11	190	17 J	21 J	33	22	90
ICFU2S18	8/6/98	2	<1.1	36	6	6.6 J	9.3	3.3 J	17
ICFU2S19	8/6/98	0.5	<1.1	5.7	<2.1	<2.1	2.8	<11	6.7 J
ICFU2S19	8/6/98	1.5	0.35 J	7.8	5.5	17 J	3	4.6 J	21
ICFU2S20	8/6/98	0.5	<1.1	5.6	2.6	0.93 J	9.1	1.5 J	5.5 J
ICFU2S20	8/6/98	1.5	0.3 J	5.6	26	25 J	2.4	<12	8.1 J
ITU2S34	5/19/00	0.5	7 J	570	430	1410	---	---	---

ft. bgs - feet below ground surface
ug/kg - micrograms per kilogram
mg/kg - milligrams per kilogram

TPH-d - total petroleum hydrocarbons as diesel
TPH-mo - total petroleum hydrocarbons as motor oil
< - not detected above the reporting limit
J - estimated value

Table 1-1: Chemicals of Concern Detected in Soil from Localized Area of Elevated Concentrations

Location	Date	Depth, ft. bgs	Aldrin ug/kg	Dieldrin ug/kg	4,4'DDD ug/kg	4,4'DDT ug/kg	Lead mg/kg	TPH-d mg/kg	TPH-mo mg/kg
ITU2S35	5/19/00	0.5	18 J	660	2230	6570	---	---	---
ITU2S35 (Dup)	5/19/00	0.5	20 J	610	2630	6790	---	---	---
ITU2S36	5/19/00	0.5	240	4450	9410	17200	---	---	---
ITU2S37	5/19/00	0.5	<25	56	390	860	---	---	---
ITU2S38	5/19/00	0.5	<25	16 J	300	510	---	---	---
ITU2S39	5/19/00	0.5	33	300	3120	5520	---	---	---
ITU2S40	5/19/00	0.5	38	240	2890	10200	---	---	---
ITU2S41	5/19/00	0.5	160	1600	2060	2990	---	---	---
ITU2S42	5/19/00	0.5	3 J	60	230	240	---	---	---
ITU2S43	5/19/00	0.5	15 J	200	1330	2630	---	---	---
ITU2S43	7/6/00	1	<1.2	0.3 J	<2.5	<2.5	---	---	---
ITU2S44	5/19/00	0.5	9 J	47	190	750	---	---	---
ITU2S45	5/19/00	0.5	6 J	150	430	2190	---	---	---
ITU2S45 (Dup)	5/19/00	0.5	2 J	16 J	100	580	---	---	---
ITU2S46	5/19/00	0.5	3 J	2060	1620	5120	---	---	---
ITU2S47	5/19/00	0.5	<11	9340	5410	15000	---	---	---
ITU2S48	5/19/00	0.5	<11	18200	2930	6530	---	---	---
ITU2S49	5/19/00	0.5	<11	969	3030	8050	---	---	---
ITU2S50	7/6/00	0	<100	<210	2100	9070	---	---	---
ITU2S50	7/6/00	1	<1.1	<2.2	3	7.9	---	---	---
ITU2S51	7/6/00	0	<210	1700	2200	11500	---	---	---
ITU2S52	7/6/00	0	30 J	530	920	3900	---	---	---
ITU2S52	7/6/00	1	<6.1	130	73	258	---	---	---
ITU2S52 (Dup)	7/6/00	0	<260	500 J	2100	16500	---	---	---
ITU2S53	7/6/00	0	<1000	28000	2000 J	6700	---	---	---
ITU2S54	7/6/00	0	8 J	<110	370	1200	---	---	---
ITU2S54	7/6/00	1	<1.2	5.7	0.8 J	<2.4	---	---	---

ft. bgs - feet below ground surface
ug/kg - micrograms per kilogram
mg/kg - milligrams per kilogram

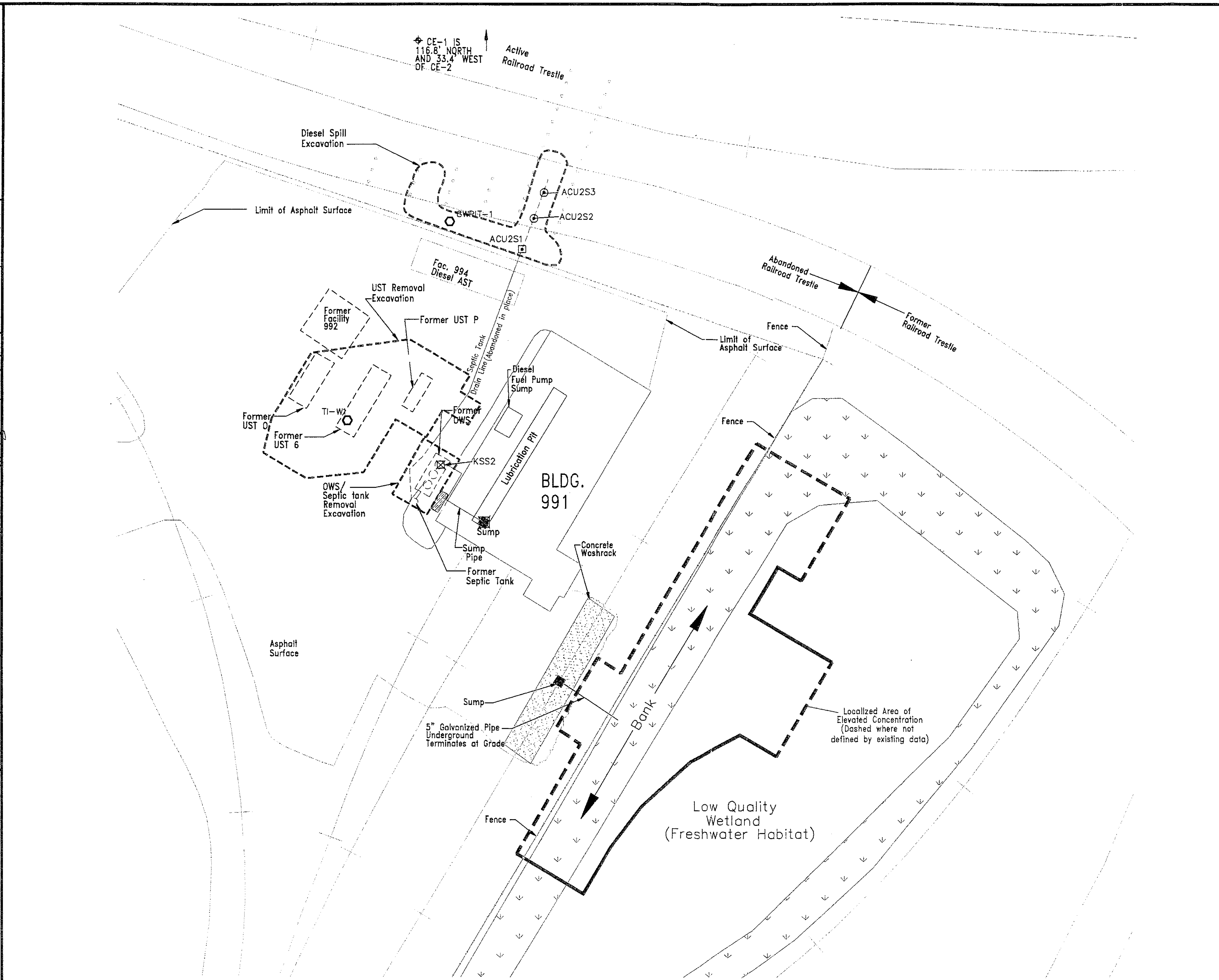
TPH-d - total petroleum hydrocarbons as diesel
TPH-mo - total petroleum hydrocarbons as motor oil
< - not detected above the reporting limit
J - estimated value

Table 1-2: Soil Cleanup Levels

Chemical of Concern	Cleanup Level	
Aldrin	75	µg/kg[b]
4,4'-DDD	2,670	µg/kg
4,4'-DDE	1,880	µg/kg
4,4'-DDT	1,880	µg/kg
Chlordane	530	µg/kg
Dieldrin	160	µg/kg
Diesel	8,000	mg/kg
Motor Oil	58,000	mg/kg

[a] mg/kg - milligrams per kilogram
[b] µg/kg - micrograms per kilogram
Source: IT Corporation. 2000. *Removal Action Work Plan for OU2 Soil at Oakland Army Base.* Oakland, California. May.

FIGURES



LEGEND

Railroad

Concrete Area

Removed Structures or Excavated Areas

N

SCALE IN FEET 17.5 0 17.5 35 52.5

SCALE IN METERS 5 0 5 10 15 20

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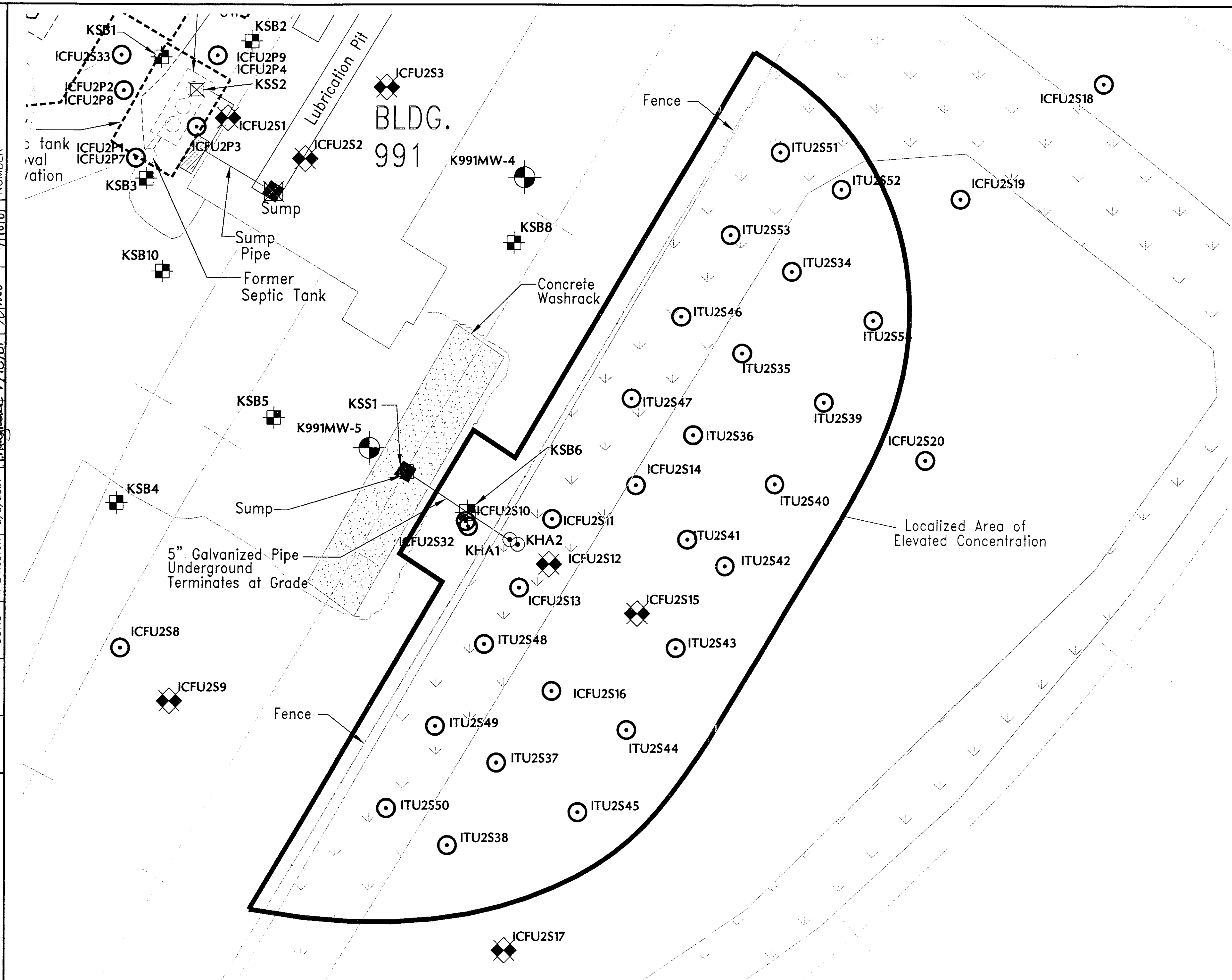
FIGURE 1-1

BOUNDARY OF LOCALIZED AREA OF ELEVATED CONCENTRATIONS OPERABLE UNIT 2

Oakland Army Base Oakland, California

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
---	---	CONC	R. LANGSTON 8/29/2000	7/10/01	7/10/01	870501-B292



LEGEND

	Railroad
	Concrete Area
	Removed Structures or Excavated Areas
KSB6	Historical Soil and Groundwater Sample
ICFU2S14	Soil Sample
KHA2	Historical Sample
ICFU2S12	ICF Soil and Groundwater Sample
KSS1	Source Sample Sediment

N

SCALE IN FEET

10 0 10 20 30

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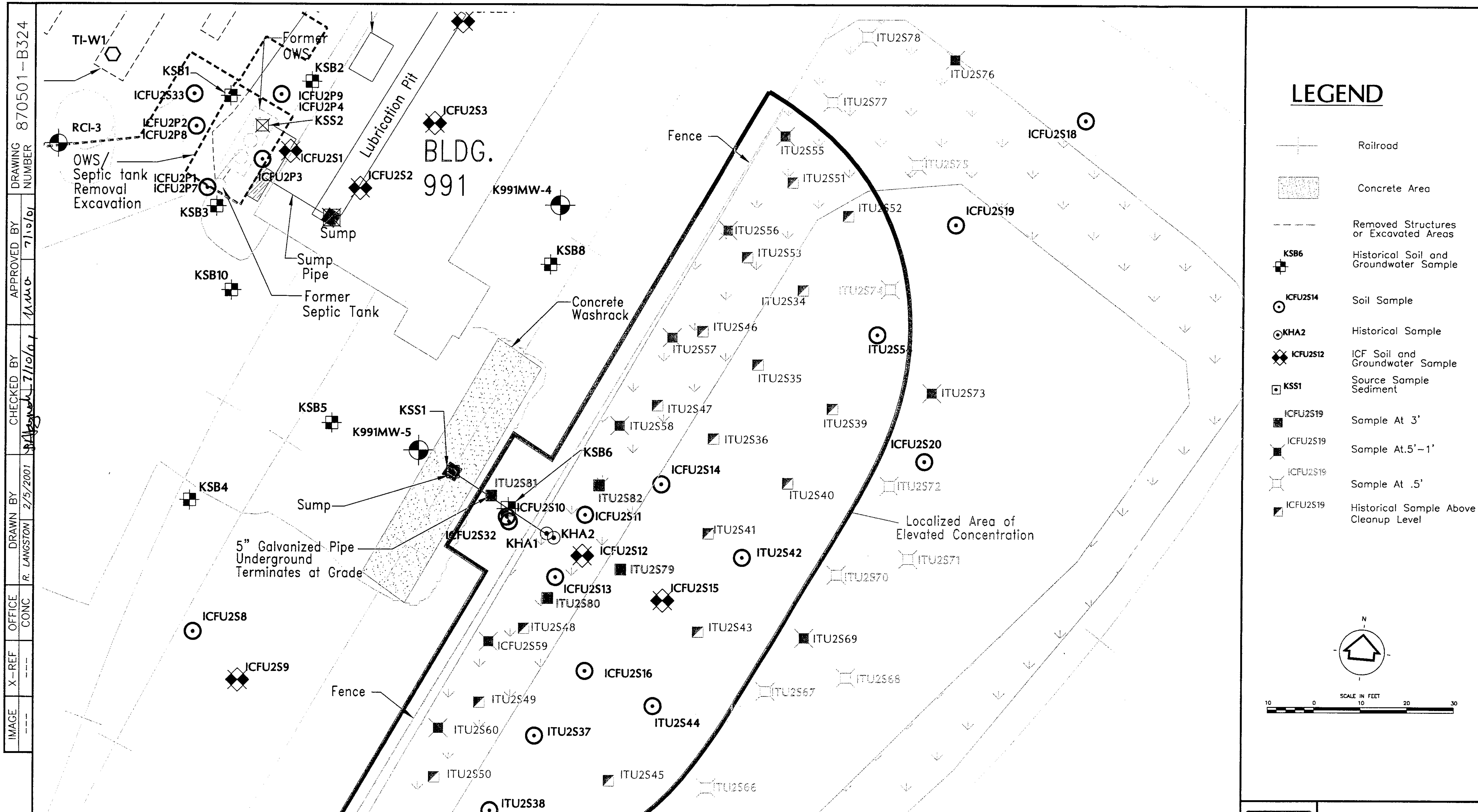
FIGURE 1-2

SOIL SAMPLE LOCATIONS AND LOCALIZED AREA OF ELEVATED CONCENTRATIONS

Oakland Army Base
Oakland, California

DRAWING NUMBER	APPROVED BY	CHECKED BY	DRAWN BY	OFFICE	X-REF	IMAGE
870501-B324	7/10/01	7/10/01	R. LANGSTON 2/5/2001	CONC	---	---



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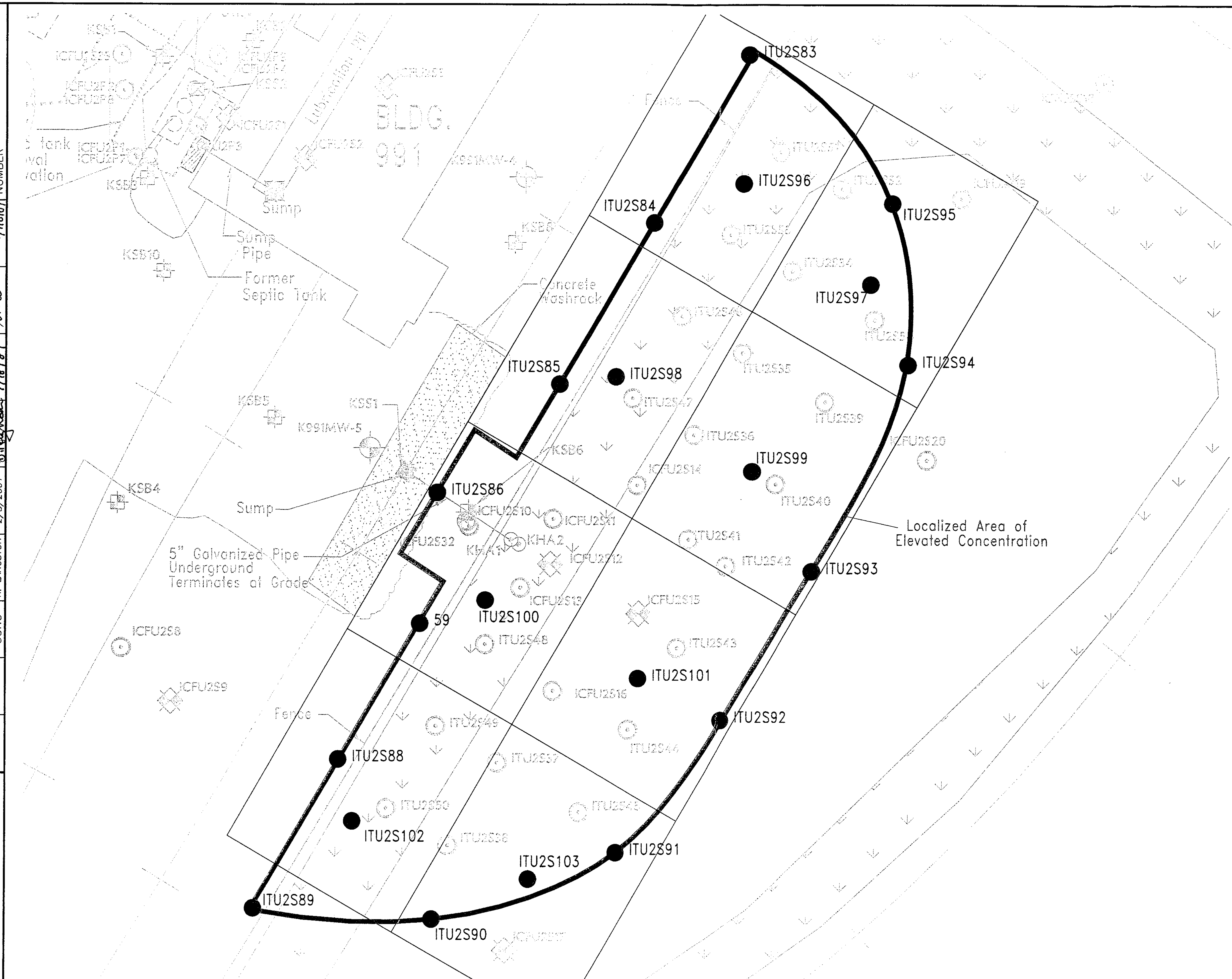
SACRAMENTO DISTRICT

FIGURE 1-3

PRE-EXCAVATION
SOIL SAMPLE LOCATIONS AND LOCALIZED
AREA OF ELEVATED CONCENTRATIONS

Oakland Army Base
Oakland, California



LEGEND

- Railroad
- Concrete Area
- Removed Structures or Excavated Areas
- Historical Soil and Groundwater Sample
- Soil Sample
- Historical Sample
- ICF Soil and Groundwater Sample
- Source Sample Sediment
- ITU2S89 Approximate Location of Confirmation Soil Sample

N

SCALE IN FEET: 10 0 10 20 30

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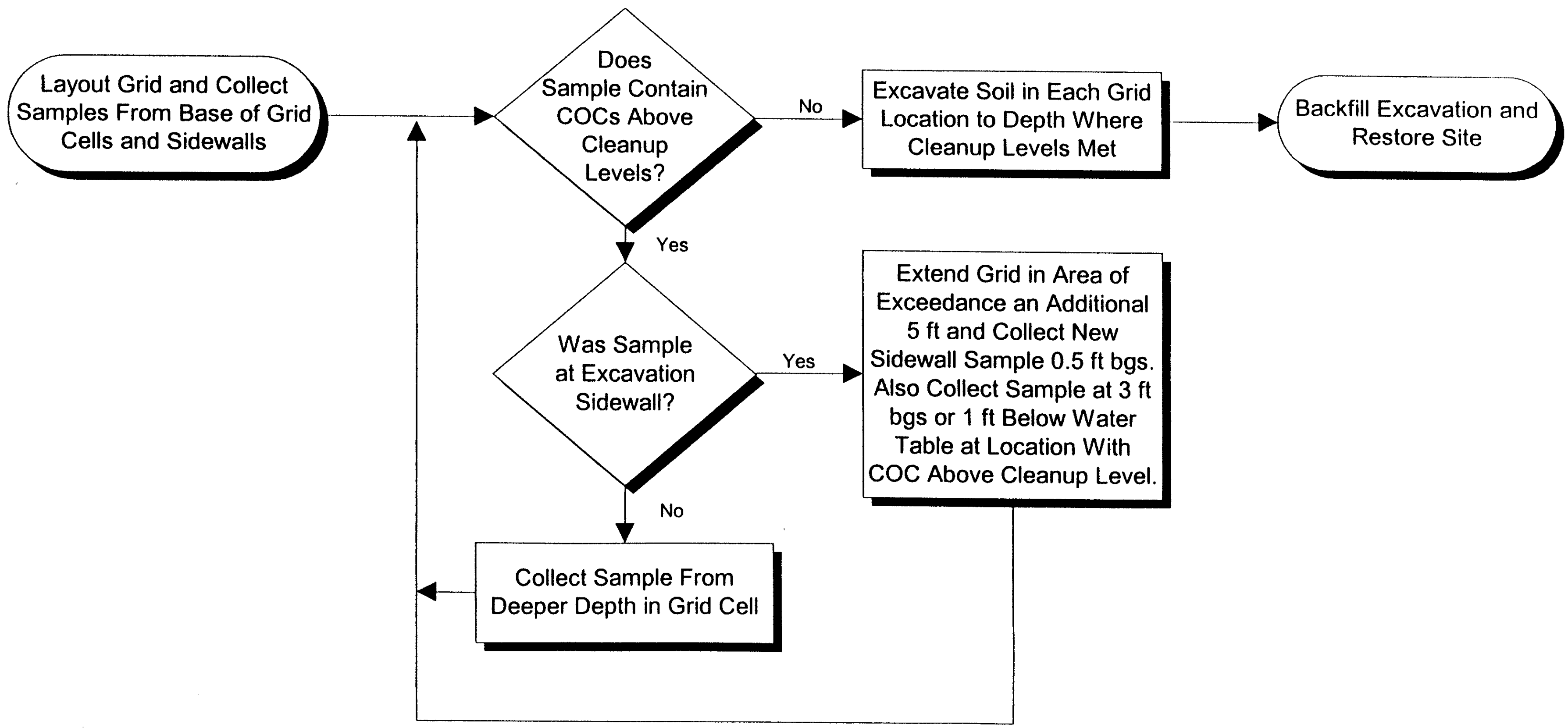
FIGURE 2–1

SOIL SAMPLE LOCATIONS
APPROXIMATE CONFIRMATION

Oakland Army Base
Oakland, California

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
---	---	CONC	R. LANGSTON 2/5/2001	7/10/01	7/10/01	870501-B353

Figure 2-2
Guidance For Soil Sampling And Excavation



e:f2-1srw.vsd

ATTACHMENT 1

PROJECT SCHEDULE

TYPICAL PROJECT SCHEDULE
OPERABLE UNIT 2 SOIL REMOVAL
OAKLAND ARMY BASE

Activity	**Date(s)**
Soil Sampling	July 16 - July 18, 2001
Sample Analysis	July 19 - July 26, 2001
Mobilization	August 13, 2001
Clean/Grout Sump, Remove Pipe	August 16 - August 17, 2001
Soil Excavation	August 20 - August 31, 2001
Waste Sampling	September 3, 2001
Site Restoration	September 10 - September 14, 2001
Waste Profiling	September 17, 2001
Waste Transportation and Disposal	September 24 - September 28, 2001
Construction Report Revision B submittal to OARB and USACE	December 10, 2001
Receipt of OARB and USACE Comments	December 17, 2001
Construction Report Revision C Submittal to Regulatory Agencies	January 1, 2002
Receipt of Regulatory Agency Comments	January 1 - January 28, 2002
Final Construction Report Submittal	February 28, 2002

ATTACHMENT 2

ACTIVITY HAZARD ANALYSIS

ATTACHMENT 2
ACTIVITY HAZARD ANALYSIS

Principle Steps	Potential Hazards	Recommended Controls
Mobilization Work Area and Equipment Set-up and operations.	Slip/Trip/Fall, muscle strain • Contact with moving equipment. • Biological Hazards.	Keep all nonessential personnel out of work area. Practice ergonomic precautions. Wear Level D PPE. Identify potential biological hazards prior to beginning work.
Sampling of soil Use hand auger and drive sampler and drilling to collect soil samples prior to soil removal excavation.	Exposure to hazardous waste Release of stored energy • Electrical shock by contacting any underground utilities. Inhalation of fumes. Heat and Cold Stress	Technicians must use PPE indicated or at the discretion of the Site Safety and Health Officer (SSHO). Site must be cleared of any underground utilities by surveyor prior to sampling. Monitor worker breathing zones with a PID. Monitor for heat and cold stress.
Excavation and staging of soil spoils with heavy equipment.	Heavy equipment operation • Bodily injury during equipment movement. • Damage to overhead or underground utility lines. Slip/Trip/Fall • Unshored excavations Noise Hazards Exposure to hazardous waste	Keep all nonessential personnel out of work area Site must be cleared of any underground utilities by surveyor prior to excavation. Overhead, energized lines must be kept at minimum clearances as per USACE EM 385-1-1 Section 11.E Equipment operator must be able to see site personnel at all times; use communication – such as hand signals to guide excavator. Excavator must be equipped with operable backup alarm. Store soil spoils at a distance of at least 4 feet behind excavation opening. Personnel and equipment must remain at a distance equal to a 1:0.5 ratio with the excavation depth from the edge

ATTACHMENT 2
ACTIVITY HAZARD ANALYSIS

Principle Steps	Potential Hazards	Recommended Controls
		of the excavation unless approved by the SSHO or designated representative. Technicians must use PPE indicated or at the discretion of the SSHO.
	Inhalation of fumes.	Monitor worker breathing zones with a PID.
	Heat and Cold Stress	Monitor for heat and cold stress.
Decontamination	Exposure to site contaminants and inhalation of fumes and dust.	If necessary establish a formal decon area for personnel and equipment decontamination. Follow organized procedure for PPE removal and equipment decontamination.
	Inhalation of fumes.	Monitor worker breathing zones with a PID.
	Pressure washer can cause severe bodily injury.	Instruct personnel in proper use of pressure washer.
Site restoration Operation of heavy equipment	Physical contact with moving equipment Exposure to dusts Noise Hazards Heat and Cold Stress	Maintain eye contact with equipment operator. Wear high visibility safety vests. Heavy equipment shall have backup alarms. Keep site personnel at a minimum. Wear half-face dust APR if necessary. Wear appropriate hearing protection. Monitor for heat and cold stress.
Safety Equipment Required	**Inspection Requirements**	**Training Requirements**
Modified Level D PPE is the level required by workers on this site. Including: Tyvek coveralls, steel-toed boots, eye protection goggles, hard hats, and chemically resistant gloves. Support Zone including: Eyewash, first aid kit, and fire extinguisher.	Inspect excavation area(s) on a daily basis when work is being conducted to ensure proper PPE and support is being used and maintained.	HAZWOPER Certification and Medical Surveillance; a minimum of two on-site personnel must be trained in first aid and CPR; Basewide Safety and Health Plan (BWSHP) sign-off. Site personnel will be evaluated for ability to wear respirators as part of the medical surveillance program.

APPENDIX A

SAMPLING AND ANALYSIS PLAN

FINAL
SAMPLING AND ANALYSIS PLAN

FOR
SOIL REMOVAL
OPERABLE UNIT 2
OAKLAND ARMY BASE
OAKLAND, CALIFORNIA

SACRAMENTO TERC II
USACE CONTRACT NO. DACW05-96-D-0011
CTO NO. 01 - WAD NO. 04

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Nora M. Okusu Sr. Project Manager, IT Corporation	Signature	7/11/01 Date
Michael Reed Quality Control System Manager, IT Corporation	Signature	7-11-01 Date

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS

APCL	Applied Physics and Chemistry Laboratory
bgs	Below ground surface
BRAC	Base Realignment and Closure
°C	Degree Celsius
CAM	California Assessment Method
COC	Chemicals of Concern
CQC	Contractor Quality Control
CTO	Contract Task Order
4-4'-DDD	Dichloro-diphenyl-dichloroethane
4,4'-DDT	Dichloro-diphenyl-trichloroethane
DQO	Data Quality Objective
FID	Flame Ionization Detector
FSP	Field Sampling Plan
ft	Feet
HCl	Hydrochloric Acid
ICF KE	ICF Kaiser Engineers, Inc.
IDW	Investigation Derived Waste
IT	IT Corporation
mg/kg	Milligrams per Kilogram
mL	Milliliter
µg/kg	Micrograms per Kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
OARB	Oakland Army Base
OU	Operable Unit
PID	Photoionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limit
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
RAW	Removal Action Work Plan
RI	Remedial Investigation
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
STLC	Soluble Threshold Limit Concentration

LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS
(Continued)

SVOC	Semi-volatile Organic Compounds
TAL	Target Analyte List
TAT	Turnaround Time
TCLP	Toxicity Characteristic Leaching Procedure
TERC	Total Environmental Restoration Contract
TM	Technical Manager
TPH	Total Petroleum Hydrocarbon
TPH-d	Total Petroleum Hydrocarbon as diesel
TPH-mo	Total Petroleum Hydrocarbon as motor oil
TRPH	Total Recoverable Petroleum Hydrocarbon
UPRC	Union Pacific Railroad Company
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOA	Volatile Organic Analyte
VOC	Volatile Organic Compounds
WAD	Work Authorization Document

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) was prepared by IT Corporation (IT) for Contract Task Order (CTO) No. 1 – Work Authorization Document (WAD) No. 4 from the U.S. Army Corps of Engineers (USACE), Sacramento District under the Total Environmental Restoration Contract (TERC) II Contract No. DACAW05-96-D-0011. IT will perform confirmation sampling to support removal action at Operable Unit (OU) 2. Analytical results for the confirmation samples will be used to verify that site conditions meet the established soil cleanup levels after soil is removed.

This SAP, Appendix A of the *Soil Removal Work Plan*, describes the objectives, rationale, methods, and procedures to collect and analyze samples for the project. This document incorporates requirements of the document entitled *Removal Action Work Plan for OU2 Soil at Oakland Army Base* (IT, 2000) and *Basewide Sampling and Analysis Plan (Quality Assurance Project Plan [QAPP] and Field Sampling Plan [FSP]) for Oakland Army Base* (ICF Kaiser, 1998a).

2.0 PROJECT ORGANIZATION

This section of the SAP describes the project organization for the implementation of this SAP. IT will be the Contractor for this work; subcontractors will be employed for site feature protection, excavation, laboratory analytical services, waste management, and site restoration. USACE will provide direction and oversight of engineering and remedial construction activities.

2.1 RESPONSIBILITIES

Responsibilities and qualifications for key sampling and analysis project personnel are provided in the following subsections.

2.1.1 Project Manager

The IT Project Manager (PM), Nora Okusu, is responsible for administration of all technical and financial aspects of the Oakland Army Base (OARB) project, including this construction project. She is the primary contact with the USACE personnel.

2.1.2 Technical Manager

The Technical Manager (TM), Bruce Haymaker, is responsible for implementing the technical, schedule, and budget aspects of the remedial planning, construction, and reporting aspect of the project. The TM reports to the PM.

2.1.3 Project Superintendent

The Project Superintendent, to be determined, is responsible for overseeing construction activities performed by contractors at the site. For day-to-day project specific activities, the Project Superintendent reports to the TM.

2.1.4 Field Staff

Field support staff will be used to assist with sample collection, preservation, and shipping. The field staff report to the Project Superintendent and to the Project Chemist for chemistry related issues.

2.1.5 Contractor Quality Control System Manager

Michael Reed will support the PM on day-to-day operations. The Contractor Quality Control (CQC) System Manager is responsible for overseeing and documenting all aspects of quality control described in the CQC plan (Appendix B of Work Plan).

2.1.6 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO), to be determined, is responsible for overseeing and documenting all field activities for compliance with the Basewide Safety and Health Plan (ICF Kaiser Engineers, Inc. [ICF KE], 1997) and the Activity Hazard Analysis (Attachment 2 of the Work Plan). The SSHO supports the PM on day-to-day operations, and will report to Dr. Rudy Von Burg, CIH, Safety and Health Manager.

2.1.7 Project Chemist

Susan Huang will support the PM in day-to-day operations and coordinate chemical Quality Control (QC) activities with the CQC Systems Manager. The Project Chemist has sufficient authority to ensure that project activities comply with applicable specifications of this SAP, the contract, and Delivery Order. This authority applies equally to all project activities, whether performed by IT or its subcontractors and suppliers. The Project Chemist is responsible for serving as a point of contact for USACE on environmental chemistry issues.

2.1.8 Contract Laboratory Project Manager

The Contract Laboratory Project Manager, Mark Heckman of Applied Physics & Chemistry (APCL) Laboratory, is responsible for ensuring compliance of contract laboratory activities with the approved SAP and the QAPP. The Project Chemist coordinates project sample workload and schedule with the Contract Laboratory Manager or designee.

2.1.9 Subcontractors

Subcontractors will be employed for remedial construction, analytical services, and waste management.

3.0 PROBLEM DEFINITION/BACKGROUND

3.1 PROJECT LOCATION AND BACKGROUND

OARB was intensely developed during World War II and served as a major cargo port during the war. Following the end of World War II, OARB continued its mission as a major shipping and rail terminal and provided key logistic support for the Korean War, the Vietnam War, and Operation Desert Shield/Storm. In June 1995, the Base Realignment and Closure (BRAC) Commission recommended OARB for closure and authorized the establishment of an Army Reserve Enclave on a small part of the Base to continue after its closure. The Base officially closed on September 30, 1999.

Building 991, which served as a switch engine repair shop, was constructed in 1942. A concrete washrack used for rail cars is located south of Building 991. A sump located in the center of the washrack is connected to a drain line that discharges into a low quality wetland owned by Union Pacific Railroad Company (UPRC). Results of the OU2 remedial investigation (RI) indicate that the washrack and pesticide releases along the property fence line were sources of pesticide contamination in the low quality wetland.

3.1.1 Site Description

The majority of the OU2 site is paved or developed, and wildlife habitat or endangered species are not expected to exist at OU2. The wetlands delineation report (Foster Wheeler, 1999) determined that the wetland was "low quality" based on its small size, low species diversity, and the presence of numerous non-native plant species. No special-status species are expected to inhabit the low quality wetland on a regular basis due to the limited extent of forage and cover.

3.1.2 Characteristics and Past Site Activities

Investigations of impacts to soil and groundwater have been conducted, including an RI that was completed in 1999 and additional sampling conducted in May and July 2000. Elevated concentrations of pesticides were detected in soil samples collected within approximately 30 feet (ft) of the washrack drain pipe discharge point and along the fence between the low quality wetland and OARB. Total petroleum hydrocarbons (TPH) as diesel (TPH-d) and motor oil (TPH-mo) were also detected at elevated levels in the vicinity of the washrack drain pipe discharge. Maximum concentrations of pesticides, and TPH detected in OU2 are presented below.

Analyte	Maximum Concentration
Aldrin	29,200 µg/kg
4,4'-DDD	23,000 µg/kg
4,4'-DDT	19,000 µg/kg
Dieldrin	80,000 µg/kg
TPH-diesel	70 mg/kg
TPH-motor oil	73,400 mg/kg

µg/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram

3.2 PROJECT GOAL

The goal of this sampling and analysis program is to verify that contaminant concentrations along the horizontal and vertical boundaries of the OU2 excavation are below soil cleanup levels that were established in the RAW. The chemicals of concern (COCs) and their cleanup levels are presented in Table 1-2 of the Work Plan.

4.0 PROJECT DESCRIPTION

This section describes sampling and analysis activities for the OU2 soil removal that address the project goals identified in Section 3. The following subsections present a general scope of work, deliverables, definable features of work, and schedule for sampling and analysis related tasks.

4.1 GENERAL SCOPE OF WORK

Sampling and analysis will be conducted to determine if contaminants concentrations in soil remaining in place meet cleanup levels.

4.2 DEFINABLE FEATURES OF WORK

Table 4-1 lists the corresponding definable features of work governed by this SAP, responsible organization, and reference to the procedures that will be followed to conduct the work.

4.3 PROJECT SCHEDULE

The sampling and analysis schedule is presented in the Work Plan. A detailed schedule for daily sampling activities is contained in the Planned Sample Table (Table 4-2).

5.0 DATA QUALITY OBJECTIVES

5.1 PROJECT DATA QUALITY OBJECTIVES

A data quality objective (DQO) process was applied to optimize the design of data gathering and analysis plans required to meet the objectives as defined in this SAP. The seven steps of the DQO process prescribed by the U.S. Environmental Protection Agency (USEPA540-R-93-071) are described below:

State the Problem. Organochlorine pesticides and TPH, in soil at OU2 have been identified in the Removal Action Work Plan (RAW) as COCs. The RAW indicates that these COCs are a potential risk to human health.

Identify the Decisions. Contaminated soil with concentrations above the levels as defined in the RAW are to be excavated and removed. Confirmation samples will be collected and analyzed to verify that cleanup levels have been met.

Identify Inputs to the Decisions. Cleanup levels specified in the RAW will be used to confirm that the excavated boundaries are sufficient. Confirmation sampling and analysis will be conducted as an iterative process (as necessary) until removal action goals are met to confirm the area of the excavation.

Define the Study Boundaries. The estimated vertical and horizontal limits of soil containing COCs above cleanup levels are indicated on Figure 1-2 of the Work Plan. Pre-excavation confirmation soil samples will be collected as indicated in Figure 1-3. In addition, post-excavation confirmation samples will be taken to verify that the removal action has met the goals of the cleanup levels (see Figure 2-1, and 2-2 of the WP). The excavation area will be divided into grid squares of 40 ft by 50 ft. One sample will be taken from each grid square. The sidewalls of the excavation will also be sampled at the rate of one sample every 40 ft along the sidewall.

Develop Decision Rules. Confirmation samples will be collected and analyzed to ensure cleanup goals will be met prior to initiating soil excavation. Confirmation samples will be submitted for analysis of COCs. If confirmation sample results indicate that cleanup levels have not been met, then additional samples will be collected until the limits of the excavation are defined.

Specify Limits on Decision Errors. Analytical methods and QC criteria defined in the Basewide QAPP will be used to limit the decision errors. Data that meet the precision, accuracy, and completeness requirements specified in the Basewide QAPP Section 4.0 will be useable for the project objectives.

Optimization of Investigation Design for Obtaining Data. The sampling frequency is designed to minimize the chance of not identifying and removing contaminated soil.

5.2 FIELD AND LABORATORY DATA QUALITY OBJECTIVES

Measurements of the concentrations of target compounds will be made to support project DQOs. Data quality indicators are defined in Section 2.4 of the Basewide QAPP. Tables 5-1 and 5-2 define the criteria for precision, accuracy, and representativeness for both field and laboratory activities to ensure the quality of the data are appropriate for the data's intended use.

6.0 SAMPLING PROCESS DESIGN

This section describes the rationale and sampling strategies for soil samples to be collected and analyzed. These sampling and analysis strategies have been designed to meet the project objectives as described in Sections 3, 4, and 5 of this SAP. The Planned Sample Table (Table 4-2) indicates the analytical suites planned for each sample to be collected.

The sampling approach is discussed below in terms of initial and additional sampling and the procedures to be used for this confirmation sampling effort. The sampling approaches for excavated stockpile samples are also discussed.

6.1 PRE-EXCAVATION SOIL SAMPLING

Soil at OU2 will be sampled to determine the final excavation limits. Contaminated soil with concentrations above the cleanup levels will be excavated and removed following the analysis of confirmation soil samples.

Initial sample locations are shown on Figure 1-3 of the Work Plan. Figure 2-2 of the Work Plan presents the guidance that will be followed for soil sampling and excavation.

Pre-Excavation Bottom Samples

The vertical extent of the pesticide contamination is not confirmed on the west side of the wetland along the fence line, nor at a 20 foot radius around the end of the sump pipe discharge end. The four bottom samples to be taken around the 20 foot radius of the pipe end will be taken at a depth of 3 feet bgs. The 12 bottom samples along the boundaries will be taken at a depth equivalent to 1 foot bgs in the wetland.

If the concentration of any COC exceeds the cleanup level in an excavation bottom sample, then additional deeper samples will be collected and analyzed until cleanup levels are met for all COCs. Samples depths may be adjusted based on field conditions.

Pre-Excavation Boundary Samples

Existing analytical data from soil samples collected about every 20 feet define the approximate boundaries of the planned initial excavation boundary (Figure 1-2). To define the horizontal extent of contamination above COCs, pre-excavation soil boundary samples will be collected along the initial excavation boundaries at a depth of 0.5 feet bgs at the locations shown on Figure 1-3.

If the concentration of any COC exceeds the cleanup level in an excavation boundary sample, then the grid will be extended an additional 5 ft and an additional boundary sample will be collected and analyzed. An excavation bottom sample will also be collected at the original boundary sample location where cleanup levels were exceeded.

6.2 CONFIRMATION SAMPLES

Subsequent to the soil excavation, confirmatory samples will be collected along the excavation bottom and sidewalls. The excavation bottom samples will be collected on a 40x50 foot grid. Sidewall samples will be collected every 40 ft. The total number of confirmation samples will be approximately 20. The samples will be analyzed for pesticides and TPH, which are the contaminants for this removal action.

Figure 2-1 of the Work Plan presents the approximate locations of the samples.

6.3 WASTE PROFILE SAMPLING

6.3.1 Waste Profile Soil Sampling

Excavated soil will be segregated into appropriate stockpiles on the paved area to the west and south of Building 991 where samples will be collected and analyzed to characterize the soil for off-site disposal. Profiling will include collecting composite samples in the following manner:

- The individual stockpiles shall be divided into 100 cubic yard segments;
- Each 100 cubic yard segment will be subdivided into four sub-sections; and
- A random sample from each sub-section will be collected and composited for analysis of COCs and waste profiling parameters.

Samples will be collected in accordance with Section 7.2. The chemical analyses are specified in Section 8.0.

6.3.2 Drain Line Verification Sampling

The removed and cleaned drain line will be sampled to verify that the piping is suitable for disposal as miscellaneous waste. The rinsate sample will be collected by pouring uncontaminated, distilled water through a representative sample of cleaned piping. Samples will be collected in accordance Section 7.4. The chemical analyses are specified in Section 8.0.

7.0 FIELD PROCEDURES

Sampling and related activities are to be performed as prescribed in this section and referenced sections in the Basewide QAPP. Through implementation of the QAPP-prescribed procedures, samples will be collected and controlled in a manner to promote sample integrity and representativeness. Field procedures that will be implemented for this project are summarized below.

7.1 FIELD DOCUMENTATION

Required field records for this project include sample labels, chain-of-custody forms and seals, cooler receipt checklists, field logbooks, and field checklists. Photographs and drawings will also be used to document unanticipated site conditions.

7.1.1 Field Activity Daily Logs

All sampling activities will be recorded in Field Activity Daily Log Forms. Entries will be dated, legible, written in permanent ink, and will contain accurate and inclusive documentation of project activities. If corrections are necessary, the incorrect information will be struck out with a single line and the correction will be initialed. Each Field Activity Daily Log Form will be dated and signed.

7.1.2 Collected Sample Form

The Collected Sample Form will supplement information recorded on a Field Activity Daily Log Form. All sample collection information pertinent to the project database will be recorded on a Collected Sample Form. Each Collected Sample Form will contain information for a single sample, and will be consecutively numbered, dated, and signed. Each sample will be assigned an index number. This number will appear on each Collected Sample Form. All entries will be made in indelible ink and all corrections will consist of line-out deletions that are initialed and dated. There should be no blank spaces on the form. A single line or "Not Applicable" or "NA" should be written in spaces where no information was collected. Entries in the Collected Sample Form may include some or all of the following information:

- Installation;
- Area;
- Location ID;
- Date (yyyymmdd);
- Time (military format);
- Depth start of sample;
- Depth end of sample;
- Units;
- Sample type;
- Sample method;
- Sample matrix;
- QC Information;
- Rinse blank ID;
- Trip blank ID;
- Duplicate sample ID;
- USACE Split Sample ID;
- Requested analytes;
- Sample container/number of containers;

- Physical properties;
- Flame Ionization Detector (FID), Photoionization Detector (PID) readings;
- Weather;
- Temperature;
- Comments; and
- Signature of sampler and date.

7.1.3 Sample Labels

Each sample container will be labeled either with a preprinted label or a handwritten label with the project name and number, complete sample identification, date and time collected, sampler initials, and analysis requested. Sample identification numbers will be designated by a four-part code: contractor, project location, number, and unique index number.

An example of a sample designation is described below:

ITU2S55-XXXX

Where:

IT	=	Contractor (IT Corporation)
U2	=	Project location (OU2)
S55	=	location number
xxxx	=	Index number

7.1.4 Chain-of-Custody Forms

Chain-of-custody forms will be filled out for each batch of samples contained in a single cooler. Chain of custody records going to the laboratory will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid. The laboratory will be notified if the shipper suspects that the sample contains any substance for which the laboratory personal shall take safety precautions. The unused portion of the chain of custody record will be crossed out to prevent further unauthorized entries.

7.2 SOIL SAMPLE COLLECTION

Prior to collecting samples, locations will be marked on the ground surface with marking paint and/or stakes. Pre-excavation soil samples will then be collected prior to soil excavation to determine extent of contamination as shown in Figure 1-3. Soil samples will be collected with either hand tools or a direct push rig.

For surface soil samples, this first 6 inches of soil will be removed with a hand trowel or shovel. The soil sample will then be collected with a disposable or decontaminated stainless steel scoop and placed in 8 oz glass jars. For subsurface soil samples, a hand auger will be advanced to the top of the proposed sample interval. A slide hammer will then be used to advance a sample barrel containing a 6-inch stainless steel sample sleeve. The sample sleeve will be removed from the sample barrel, capped with plastic end caps, and placed in a cooler with ice.

The sample sleeves selected for analysis will be capped on both ends with plastic caps lined with Teflon sheets, labeled, and stored in an insulated container with ice.

Soil cuttings will be returned to the boring. All sample locations will be marked with a stake. The sample location will be written on the stake for future reference during step out sampling and soil excavation.

The stockpile samples will be randomly collected from each sub-section and composited in a stainless steel bowl. Approximately six inches of soil will be removed from the stockpile and then the sample will be collected with a disposable spoon or scoop and placed in a stainless steel bowl for compositing.

The composited waste profile samples will undergo the analyses specified in Table 8-1, Waste Profile Samples (solids). Table 7-1 provides sample container information.

7.3 DRAIN LINE VERIFICATION SAMPLE

The rinsate sample will be collected by pouring uncontaminated, distilled water through a representative sample of cleaned piping. The sample will be analyzed for pesticides, and TPH. Table 7-1 provides sample container information. Section 8.0 provides analytical details in Table 8-1, Environmental Sample (liquid).

7.4 WASTE WATER SAMPLE COLLECTION

A representative grab sample of the waste water generated during the field activities will be collected from the storage containers. The liquid sample will undergo the analyses specified in Table 8-1, Waste Profile Samples (liquids). Table 7-1 provides sample container information.

7.5 SAMPLE CONTAINERS AND PRESERVATION

Specifications for sample container size and type, and preservation protocols are provided in Table 7-1. These specifications are to be met for all project samples.

7.6 SAMPLE PACKAGING AND SHIPMENT

All soil samples will be transferred to the primary and quality assurance (QA) laboratories by courier or overnight delivery service. Samples will be properly packaged for shipment and submitted to the appropriate laboratory for analysis, with a separate signed chain of custody record enclosed in each cooler. Each cooler will be lined will a plastic bag. Once in place, the cooler will be filled with bubble-wrapped sample containers and sufficient package materials. Enough double-bagged ice will be utilized to ensure a sample temperature of 4 degrees Celsius (°C) during shipment. Custody seals will be attached to the outside of the cooler immediately prior to shipment.

7.7 DECONTAMINATION

All sampling equipment that is not disposable will be decontaminated before and after use. Decontamination procedures will be employed based on the assumption that all samples may contain contaminated soil. The following procedures will be used to decontaminate the sampling equipment:

- The sampling equipment will be scrubbed with a stiff brush in a wash bucket containing nonphosphate detergent solution with potable water;
- The sampling equipment will be double rinsed with potable water; and
- The sampling equipment will be final rinsed with deionized water and allowed to air dry in a clean place.

Decontamination wastewater will be stored temporarily in covered 55-gallon drums or other suitable containers until analyses are complete and until an acceptable means of disposal has been determined. All investigation-derived waste (IDW) drums or containers will be labeled clearly and stored in a secure location until final disposal is arranged.

8.0 ANALYTICAL METHODS SUMMARY

This section specifies the analytical methods that will be used for analysis of project samples. Table 8-1 summarizes the preparation and analytical methods. The laboratory will report the target analyte list (TAL) for the particular method, however, only the COC data will be evaluated. Analytical results will be reported on a dry weight basis. A turnaround time (TAT) of 7 days will be requested for the analyses.

9.0 INVESTIGATION DERIVED WASTE

Wastes generated as a result of project activities such as sample collection or personnel and equipment decontamination that are known or suspected to be contaminated with hazardous material are known as IDW. Potential contaminants of concern include pesticides, TPH, and lead. Anticipated IDW include personal protective equipment (PPE), decontamination solutions, and disposable equipment. To the extent possible, the generation of IDW will be limited and will be controlled and disposed of as prescribed in the following sections.

9.1 PROCEDURES FOR HANDLING SOLID WASTE

The sources of solid IDW may include: PPE, including, but not limited to, gloves and Tyvek suits; expendable sampling equipment; and decontamination water. Used PPE and disposable sampling equipment are to be double plastic-bagged and placed in on-site dumpsters. Excess soil will be removed from used PPE and disposable sampling equipment prior to disposal. Decontamination methods will be used to remove the excess soil if necessary. The PPE and used sampling equipment is to be subsequently disposed of at a local municipal landfill.

9.2 PROCEDURES FOR HANDLING LIQUID WASTE

Decontamination wastewater and stockpile dewatering liquid waste will be segregated and stored temporarily in covered 55-gallon drums or other suitable containers until analyses are complete and until an acceptable means of disposal has been determined. All IDW drums or containers will be labeled clearly and stored in a secure location until final disposal is arranged. Waste profile sampling is described in Section 8.0.

10.0 QUALITY CONTROL

The Project Chemist is to ensure that analysis activities performed under this project meet specified quality requirements.

10.1 FIELD QUALITY CONTROL AND QUALITY ASSURANCE

The CQC System Manager is to implement the three-phase inspections for field activities performed under this SAP. Field activities include soil sampling, sample control and custody, and generation of required field documentation. The CQC System Manager is to establish and document the inspection schedule. Checklists are to be prepared in advance of the inspection activities and used during the inspections to ensure that all critical aspects are reviewed and documented.

As specified in the OARB QAPP and Tables 5-2 of this SAP, the following field QC samples will be collected: 1) Field duplicate split samples will be collected at a frequency of at least 10 percent of the field samples, and 2) QA samples will be collected at a frequency of at least 10 percent of the field samples. Specific field QC samples to be collected are described in the Planned Sample Table (Table 4-2).

10.2 LABORATORY QUALITY ASSURANCE

The Project Chemist, with input from the Laboratory QA Officer, is to implement three-phase inspections for project analyses and related activities performed by a contract laboratory. These activities include sample receipt and custody, sample control, sample preparation and extraction, sample analysis, equipment calibration and maintenance, standards preparation and control, data review, data management, and data reporting. Prior to using the laboratory or at the early stages of use, the Project Chemist or designee will perform an inspection of the proposed laboratory facilities. The inspection may take the form of a conference call if a recent inspection was performed by IT or USACE. After the initial inspection, it is not intended that the Project Chemist be at the laboratory during each phase. Rather, the Laboratory QA Officer is to provide direct oversight at the laboratory and submit documentation to the Project Chemist that certifies compliance with specified procedures and requirements. The Project Chemist will also coordinate with USACE Chemist for QA Laboratory Analysis.

10.3 DATA REVIEWS

Upon receipt of laboratory analytical data, the Project Chemist/Synectics will verify QC results, holding time compliance, and analytical completeness in accordance with the acceptance criteria specified in the OARB QAPP. Prior to their submittal to IT, laboratory-generated data are to be reviewed by the Contract Laboratory QA Officer and certified as compliant with the requirements of this SAP. One hundred percent of the analytical data will be reviewed and a minimum of 10 percent of the analytical data will be validated by the IT Project Chemist or Synectics as prescribed in Section 4.0 of the QAPP.

10.4 CORRECTIVE ACTIONS

Corrective actions for identified deficiencies are to be documented, tracked, and verified as prescribed in tables presented in Section 3.2.2 of the QAPP. Corrective actions are required for the following conditions:

- QC data outside the defined acceptance windows for precision or accuracy;

- Blanks that contain contaminants above practical quantitation limits (PQLs);
- Undesirable trends are detected in spike or surrogate recoveries or Relative Percent Difference (RPD) between spiked duplicates;
- Unusual changes in method detection limits;
- Deficiencies are identified during internal or external audits or from the results of performance evaluation samples; and
- USACE inquiries concerning data quality.

Corrective actions are to be implemented at the most appropriate operational or management level. To the extent practical, analytical corrective actions are to be implemented at the bench level by the technician/analyst. If the problem persists or cannot be resolved at this level, the matter is to be elevated to the appropriate manager until resolution.

Documentation for corrective actions implemented by the contract laboratory are to be generated and retained in the laboratory's project file. This documentation is to be made accessible to the Project Chemist and retained per applicable contractual requirements and for no less than seven years from project closeout. A description of relevant corrective actions is to be included in the narrative that accompanies each data package.

11.0 REFERENCES

ICF Kaiser, 1998a. *Basewide Sampling and Analysis Plan for Oakland Army Base, Oakland, California, Revision B, Revision 0*. Prepared for the USACE. June.

TABLES

Table 4-1: Definable Features of Work

Feature No.	Definable Feature of Work	Responsible Organization	Work Document Reference
1	Surveys: Sample Location and Survey	IT / Survey Subcontractor	WP, Sections 2.1.4 and 2.2
2	Site Preparation	IT / Subcontractor	WP, Sections 2.1.2 and 2.4
3	Cleaning and Grouting Sump, Drain Line Excavation and Removal	IT / Subcontractor	WP, Section 2.3
4	Soil Sample Collection, Handling and Shipment	IT / Subcontractor	WP, Section 2.2 SAP, Section 7.0
5	Sample Analysis	IT / Subcontract Laboratory	SAP, Sections 7.0 and 8.0
6	Data Review, Validation and Quality Control Summary Report (QCSR)	IT / Synectics	SAP, Section 9.0
7	Excavation and Waste Management	IT / Subcontractor	WP, Sections 2.5 and 2.6
8	Waste Characterization, Profiling, Transportation and Disposal	Subcontract Laboratory / Subcontractor	WP, Section 2.9
9	Site Restoration	IT / Subcontractor	WP, Section 2.8
10	Construction Report	IT	WP, Section 3.0

Table 4-2: Planned Sample Table

Index Nos.: 2986 - 3124
OARB Area: OU2
July, 2001
Event 23

Sample Location	Sample Index (assigned in the field)	Matrix	Sample Type	Sample Depth (feet)		Pesticides (SW8081A)	TPH-d,mo (SW8015B)	CAM17 Metals	TCLP (Pest, SW8081A) (Metals SW6010B, SW7471A)	Analysis	Laboratory	Comments Turn Around Time 7 days
					Aqueous	2 x 1L	2 x 1L	1 x 0.5L	NA			
					Aqueous Preservative	Ice	Ice	HNO3	NA			
					Solid	2x8 oz jars			2x8 oz jars			
					Solid Preservative	Ice			Ice			
PRE-EXCAVATION SAMPLING												
ITU2S55		SO	NS	0.5	7/16-18/01	2X	2X			2	APCL	**MS/MSD***, West Side
ITU2S55		SO	FD	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S55		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S56		SO	NS	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S56		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S57		SO	NS	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S57		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S58		SO	NS	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S58		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S59		SO	NS	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S59		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S60		SO	NS	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S60		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S60		SO	FD	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S60		SO	QA	1	7/16-18/01	X	X			2	QA	West Side
ITU2S61		SO	NS	0.5	7/16-18/01	X	X			2	APCL	West Side
ITU2S61		SO	NS	1	7/16-18/01	X	X			2	APCL	West Side
ITU2S62		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S62		SO	NS	1	7/16-18/01	X	X			2	APCL	East Side
ITU2S63		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S64		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S65		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S65		SO	NS	1	7/16-18/01	2X	2X			2	APCL	**MS/MSD***, East Side
ITU2S66		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side

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Table 4-2: Planned Sample Table

Index Nos.: 2986 - 3124
OARB Area: OU2
July, 2001
Event 23

Sample Location	Sample Index (assigned in the field)	Matrix	Sample Type	Sample Depth (feet)		Pesticides (SW8081A)	TPH-d,mo (SW8015B)	CAM17 Metals	TCLP (Pest, SW8081A) (Metals SW6010B, SW7471A)	Analysis	Laboratory	Comments Turn Around Time 7 days
					Aqueous	2 x 1L	2 x 1L	1 x 0.5L	NA			
					Aqueous Preservative	Ice	Ice	HNO3	NA			
					Solid	2x8 oz jars			2x8 oz jars			
					Solid Preservative	Ice			Ice			
ITU2S67		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S68		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S68		SO	FD	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S69		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S69		SO	NS	1	7/16-18/01	X	X			2	APCL	East Side
ITU2S70		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S71		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S72		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S73		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S73		SO	NS	1	7/16-18/01	X	X			2	APCL	East Side
ITU2S74		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S75		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S76		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S76		SO	FD	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S76		SO	NS	1	7/16-18/01	X	X			2	APCL	East Side
ITU2S77		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S78		SO	NS	0.5	7/16-18/01	X	X			2	APCL	East Side
ITU2S79		SO	NS	3	7/16-18/01	X	X			2	APCL	Cell Bottom Sample
ITU2S80		SO	NS	3	7/16-18/01	X	X			2	APCL	Cell Bottom Sample
ITU2S81		SO	NS	3	7/16-18/01	X	X			2	APCL	Cell Bottom Sample
ITU2S82		SO	NS	3	7/16-18/01	X	X			2	APCL	Cell Bottom Sample
EB1		WH	R	NA	7/16/01	X	X			2	APCL	Rinse Sample-if necessary
EB1		WH	R	NA	7/17/01	X	X			2	APCL	Rinse Sample-if necessary
EB1		WH	R	NA	7/18/01	X	X			2	APCL	Rinse Sample-if necessary
CONFIRMATION SAMPLING												

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Table 4-2: Planned Sample Table

Index Nos.: 2986 - 3124
OARB Area: OU2
July, 2001
Event 23

Sample Location	**Sample Index** (assigned in the field)	**Matrix**	**Sample Type**	**Sample Depth (feet)**		Pesticides (SW8081A)	TPH-d,mo (SW8015B)	CAM17 Metals	TCLP (Pest, SW8081A) (Metals SW6010B, SW7471A)	Analysis	Laboratory	**Comments** Turn Around Time 7 days
					Aqueous	2 x 1L	2 x 1L	1 x 0.5L	NA			
					Aqueous Preservative	Ice	Ice	HNO3	NA			
					Solid	2x8 oz jars			2x8 oz jars			
					Solid Preservative	Ice			Ice			
ITU2S83		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S84		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S85		SO	NS	0.5	TBD	2X	2X			2	APCL	**MS/MSD***, West Sidewall
ITU2S85		SO	FD	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S85		SO	QA	0.5	TBD	X	X			2	QA	West Sidewall
ITU2S86		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S87		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S88		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S89		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S90		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S91		SO	NS	0.5	TBD	X	X			2	APCL	West Sidewall
ITU2S92		SO	NS	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S93		SO	NS	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S94		SO	NS	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S95		SO	NS	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S95		SO	FD	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S95		SO	QA	0.5	TBD	X	X			2	QA	East Sidewall
ITU2S96		SO	NS	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S97		SO	NS	0.5	TBD	X	X			2	APCL	East Sidewall
ITU2S98		SO	NS	0	TBD	X	X			2	APCL	Cell Bottom Sample
ITU2S99		SO	NS	0	TBD	X	X			2	APCL	Cell Bottom Sample
ITU2S100		SO	NS	0	TBD	X	X			2	APCL	Cell Bottom Sample
ITU2S101		SO	NS	0	TBD	X	X			2	APCL	Cell Bottom Sample
ITU2S102		SO	NS	0	TBD	X	X			2	APCL	Cell Bottom Sample
ITU2S103		SO	NS	0	TBD	2X	2X			2	APCL	**MS/MSD***, Cell Bottom Sample

Table 4-2: Planned Sample Table

Index Nos.: 2986 - 3124
OARB Area: OU2
July, 2001
Event 23

Sample Location	Sample Index (assigned in the field)	Matrix	Sample Type	Sample Depth (feet)		Pesticides (SW8081A)	TPH-d,mo (SW8015B)	CAM17 Metals	TCLP (Pest, SW8081A) (Metals SW6010B, SW7471A)	Analysis	Laboratory	Comments Turn Around Time 7 days
					Aqueous	2 x 1L	2 x 1L	1 x 0.5L	NA			
					Aqueous Preservative	Ice	Ice	HNO3	NA			
					Solid	2x8 oz jars			2x8 oz jars			
					Solid Preservative	Ice			Ice			
EB1		WH	R	NA	TBD	X	X			2	APCL	Rinse Sample
WASTE SAMPLING												
IDW1		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW2		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW3		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW4		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW5		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW6		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW7		SO	NS	NA	TBD	2X	2X	2X	2X	3	APCL	**MS/MSD***, Stockpile (composite)
IDW8		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW9		SO	NS	NA	TBD	X	X	X	X	3	APCL	Stockpile (composite)
IDW10		WW	NS	NA	TBD	X	X	X	X	3	APCL	Drain Line Rinsate

MS/MSD* = requires double volumes. Each daily shipment of 20 or fewer samples requires a MS/MSD sample.

The total number of MS/MSDs may exceed the number shown on this planned sample table.

Per USACE project chemist telephone instruction dated 7/12/01, a total of 5 % QA samples will be collected: one from the pre-excavation sampling and two from the confirmation sampling.

Matrix:	Sample Type:
SO - soil	NS - normal sample
WH - equipment rinse	FD - field duplicate
WW - waste water	QA - quality assurance (USACE splits)
	R - rinse blank
	WP - waste profile

Notes:
* = Total analyses may increase due to overexcavation.

Table 5-1: Summary of Laboratory QC Samples

Parameter [1]	Method Blanks	Laboratory Control Sample	Matrix Spike and Duplicate [3]	Surrogate Spikes
Pesticides	1 per batch [2]	1 per batch	1 per 20 field samples	All samples
TPH-d, mo	1 per batch	1 per batch	1 per 20 field samples	All samples

Notes:
(1) All methods are defined in SW846.
(2) A batch is defined as a discrete group of 20 or fewer samples extracted and analyzed together by the laboratory.
(3) A sample will be identified in the field for matrix spike/matrix spike duplicate (MS/MSD) analysis every 20 samples per matrix (extra volume will be provided).

Table 5-2: Field QC Samples and Frequency
(Refer to Table 4-2 for Details)

Item	DQO	Parameter	Frequency
Field Duplicates	P	All	1 per 10 samples
Quality Assurance	R	All	1 per 10 samples
MS/MSD	P/A	All	1 per 20 samples

A = Accuracy
P = Precision
R = Representativeness
MS/MSD = Matrix spike/matrix spike duplicate

Table 7-1: Sample Container, Preservation, and Holding Time Requirements

Environmental Samples

Analysis	Matrix	Holding Time	Containers	Preservative
Pesticides	Solid	Extraction - 14 days	one 8 ounce glass jar or one 6 inch stainless steel sleeve	Store at 4°C
TPH-d, -mo	Solid	Analysis - 40 days		
Pesticides	Liquid	Extraction - 14 days	2 x 1 Liter amber glass	Store at 4°C
TPH-d, -mo	Liquid	Analysis - 40 days	2 x 1 Liter amber glass	Store at 4°C

Waste Profile Samples

Analysis	Matrix	Holding Time	Containers	Preservative
Pesticides	Solid	Extraction – 14 days Analysis – 40 days	2 x 8 ounce jar or 2 x 6 inch stainless steel sleeve	Store at 4°C
CAM 17 Metals	Solid	28 days		Store at 4°C
TCLP Pesticides and Metals	Solid	Extraction – 28 days		Store at 4°C
Pesticides	Liquid	Extraction – 14 days Analysis – 40 days	2 x 1 – Liter amber glass	Store at 4°C
CAM 17 Metals	Liquid	28 days	500 mL plastic	HNO_3, 4°C

Notes:

CAM	=	California Assessment Method
HCl	=	Hydrochloric Acid
mL	=	Milliliter
TCLP	=	Toxic Characteristic Leachate Procedure
VOA	=	Volatile Organic Analyte

Table 8-1: Analytical Methods

Environmental Samples

Parameter	Matrix	Preparation Method	Analytical Method
Pesticides	Solid/Liquid	3545 or 3550B	EPA 8081A
TPH-d, -mo	Solid/Liquid	3550B; 3630C silica gel cleanup	EPA 8015B

Waste Profile Samples

Parameter	Matrix	Preparation Method	Analytical Method
Pesticides	Solid/Liquid	Per Method	EPA 8081
CAM 17 Metals	Solid/Liquid	Per Method	EPA 6010
Leachable Methods TCLP, Pesticides and CAM 17 Metals Only	Solid/Liquid	EPA 1311/STLC	EPA 6010B/7470A

Notes:

CAM	=	California Assessment Method
EPA	=	Environmental Protection Agency
SVOC	=	Semivolatile Organic Compound
TCLP	=	Toxic Characteristic Leachate Procedure
TPH-d	=	Total Petroleum Hydrocarbons as diesel
TPH-mo	=	Total Petroleum Hydrocarbons as motor oil
VOC	=	Volatile Organic Compounds

APPENDIX B

CONTRACTOR QUALITY CONTROL PLAN

FINAL
CONTRACTOR QUALITY
CONTROL PLAN

FOR
SOIL REMOVAL
OPERABLE UNIT 2
OAKLAND ARMY BASE
OAKLAND, CALIFORNIA

SACRAMENTO TERC II
USACE CONTRACT NO. DACW05-96-D-0011
CTO NO. 01 - WAD NO. 04

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Bruce Haymaker Technical Manager, IT Corporation	Signature	7/11/01 Date
Nora M. Okusu Project Manager, IT Corporation	Signature	7/11/01 Date

CONTROLLED

DOCUMENT CONTROL NO. 12
ISSUED TO: H. WONG

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

CAP	Corrective Action Plan
CAR	Corrective Action Request
CQC	Contractor Quality Control
CQCP	Contractor Quality Control Plan
CR	Construction Report
CTO	Contract Task Order
IT	IT Corporation
OARB	Oakland Army Base
OSHA	Occupational Safety and Health Act
OU	Operable Unit
PPE	Personal protective equipment
QC	Quality Control
QCSR	Quality Control Summary Report
QIP	Quality Improvement Process
SAP	Sampling and Analysis Plan
SSHP	Site Safety and Health Plan
SOP	Standard Operating Procedure
SQP	Standard Quality Procedure
TERC	Total Environmental Restoration Contract
TPH	Total Petroleum Hydrocarbons
UPRC	Union Pacific Railroad Company
USACE	United States Army Corps of Engineers
WAD	Work Authorization Document
WP	Work Plan

1.0 INTRODUCTION

This Contractor Quality Control Plan (CQCP) has been developed for Oakland Army Base (OARB) by IT Corporation (IT) under U.S. Army Corps of Engineers (USACE) Total Environmental Restoration Contract (TERC) II, Contract No. DACW05-96-D-0011 – Contract Task Order (CTO) 01, Work Authorization Document (WAD) 04. It describes the Quality Control (QC) program and organization for the soil removal work to be performed at Operable Unit (OU) 2.

The *Soil Removal Work Plan for OU2* (WP) describes the engineering and sampling activities to be performed at the site. The soil removal is being completed in accordance with the *Removal Action Work Plan for OU2* (IT, 2000).

This CQCP identifies the definable features of work for the project in Section 10.0, which in turn link the chemical quality management aspects of this QC program to the *Soil Removal Sampling and Analysis Plan (SAP) for OU2*. Together, these plans, and the quality requirements and systems established by them, are relevant and applicable to all project work performed by IT, its subcontractors, and suppliers under this project.

The objectives of this CQCP are to address the specific operating needs of the project, and to establish the necessary levels of management and control to ensure that all work performed meets the technical requirements of the applicable project plans, and conforms in all respects to the requirements of the contract and applicable regulations. Specifically, this plan:

- Identifies the project QC functional organization, and defines respective QC authority, responsibilities, and qualifications;
- Defines project communication, documentation, and record-keeping procedures; and
- Establishes QC procedures, including the necessary QC supervision, oversight inspections, and tests to ensure that all work meets applicable plans, specifications, and drawings.

This CQCP was developed in accordance with the aforementioned contract, CTO and WAD, and USACE ER 1180-1-6: *Construction Quality Management*; USACE ER 1110-1-12: *Engineering and Design Quality Management*; USACE ER 415-1-10: *Contractor Submittal Procedures*; the WP; the SAP; the *Basewide Site Safety and Health Plan for OARB* (SSHP) including the project-specific *Activity Hazard Analysis*; and the *TERC II Program Contractor Quality Control Plan, DACW05-96-D-0011*.

USACE acceptance of this CQCP and the SAP referenced herein is required before the start of on-site operations under the definable features of work listed in this CQCP. Work outside the definable features of work detailed herein shall not be performed without a USACE-accepted revision or variance to this CQCP covering quality planning and execution for the additional work. If such work involves modified environmental sample collection or analysis, then a USACE-accepted revision to the SAP, referenced herein, or a suitably approved work variance, is also required prior to beginning any related field operations.

Once accepted, the distribution of this CQCP shall be controlled by the Contractor Quality Control (CQC) System Manager, Mr. Michael Reed, in order to ensure that the most recent, accepted version is available at all locations where work covered by this QC program is performed. Initial distribution of approved versions of this document shall include the Project Manager, the Technical Manager, the

USACE Project Manager, and other project staff as requested or deemed necessary by the CQC System Manager

The Contracting Officer shall be notified in writing by the CQC System Manager a minimum of seven calendar days before any proposed changes to a USACE-accepted CQCP. Revisions to this plan require the same level of approval, control, and distribution as the original. Obsolete versions of this CQCP are to be removed from points of issue and use via memorandum.

1.1 PROJECT LOCATION AND BACKGROUND

The area proposed for the removal action is within a low quality wetland that lies to the east of Building 991 on land that is owned by Union Pacific Railroad Company (UPRC). Building 991, which served as a switch engine repair shop, was constructed in 1942. During previous investigations in the area, elevated levels of pesticides, metals, and total petroleum hydrocarbons (TPH) as diesel and motor oil were detected in soil. The impact to soil in the low quality wetland is likely due to historical activities conducted at or near Building 991.

1.2 PROJECT SCOPE OF WORK

The soil removal project scope of work includes the following planned work elements that are controlled under the requirements of this CQCP:

- Engineering/Planning Activities: development of a WP, including SAP, CQCP, SSHP, and associated fieldwork planning documents. These activities will be controlled by CQC document review and control and will include development of a submittal register.
- Construction Field Activities: including site preparation; utility clearance; cleaning and grouting of Building 991 washrack sump and drain pipe; soil sample grid layout; soil sampling; soil sample preparation, collection, handling and shipment; excavation; waste stockpiling; sample analysis; sample analysis results review and management; decontamination; handling of investigation derived waste; excavation backfill; and restoration of ground surface. Quality management of these activities will be implemented through use of the three-phase control system of inspection.
- Disposal Activities: including used personal protective equipment (PPE) and sampling supplies; and, off-haul / disposal of debris, waste soil and decontamination rinse water. Quality management of these activities will be implemented through use of the three-phase control system of inspection.

1.3 PROJECT QUALITY GOALS

IT will provide engineering and field services required for all work related to soil removal. Project quality goals include:

- Ensure, through the Preconstruction Conference, that proposed work methodologies are appropriate to meet the project plans and specifications, and that all preconstruction submittals have been made;
- Ensure, through the Preparatory Phase Inspection, that utility clearance, drain line clearance and grouting, soil sampling, excavation, waste management, and site restoration personnel are adequately prepared to begin work; that key personnel are qualified to perform within the authorized scope of work; and that coordination among key personnel is well established;
- Ensure, through the Initial Phase Inspection, that work is being performed with a high level of workmanship;

- Ensure, through Follow-up Inspections, that work continues to meet the requirements of the Plans and Specifications – without deficiencies; and,
- Finally, ensure, through the Completion/Acceptance Inspection, that field activities have been completed with all submittals made to the client and approved.

2.0 PROJECT ORGANIZATION

The project organization is described in Section 2.0 of the SAP. Quality related responsibilities and authorities of essential personnel in this organization are outlined below. Changes to key personnel identified below require a CQCP update, subject to the restrictions in Section 1.0 of this CQCP. Chemical QC organizational requirements, roles/responsibilities, and authorities are further defined in the Project SAP.

2.1 PROJECT MANAGER

The Project Manager, Ms. Nora Okusu, reports to the IT TERC II Program Manager, Mr. Louis Stout, and is responsible for the quality and timeliness of all project activities, including those performed by subcontractors. Specifically, the Project Manager is responsible for implementing this CQCP and supporting the efforts of the project CQC System Manager and other project personnel performing QC functions.

2.2 TECHNICAL MANAGER

The Technical Manager, Mr. Bruce Haymaker, is responsible for onsite supervision of soil removal activities. Soil removal activities will be conducted by field support staff and/or by subcontractors. The Technical Manager reports to the Project Manager.

2.3 CQC SYSTEM MANAGER

The CQC System Manager, Mr. Michael Reed, supports the Project Manager in day-to-day operations. The CQC System Manager has sufficient authority, including stop work authority, to ensure that all project site activities comply with applicable specifications of this CQCP, the approved work documents, and the contract. This authority applies equally to all project activities, whether performed by IT or its subcontractors and suppliers.

The CQC System Manager will be responsible for planning and executing QC oversight of project operations, and shall ensure compliance with specified QC requirements in project plans, procedures, and contract documents. Specifically, the CQC System Manager will be responsible for:

- Developing, maintaining, and assessing the effectiveness of the Project CQCP-related procedures and work plans;
- Reviewing the qualifications of proposed technical staff and subcontractors;
- Planning and ensuring the performance of preparatory, initial, follow-up, and completion inspections for each definable feature of work, maintaining the QC logbook, and issuing the Daily Quality Control Report;
- Verifying that subcontracted laboratories have and operate under a QC program that complies with the Project CQCP, SAP, and applicable requirements of the contract; and
- Assigning additional qualified personnel to conduct field and chemical quality control activities, when justified by project work scope and circumstances.

The CQC System Manager is also responsible for attending the coordination meeting(s) and any necessary technical planning meetings, and shall also notify the USACE and OARB representatives 48 hours in advance of beginning any of the required preparatory inspection phases, and 48 hours in advance of beginning any initial inspection phases. The CQC System Manager, or designee, will be physically on-site whenever project-related field work is in progress, and shall chair periodic QC meetings to track quality issues and forecast upcoming inspection activities. If absent from the site during project operations, the CQC System Manager will designate an alternate with equivalent responsibility and authority.

2.4 PROJECT CHEMIST

The Project Chemist, Ms. Susan Huang, reports functionally to the Program Chemist, Ms. Victoria Taylor, and administratively to the Project Manager. She is responsible for managing all project sampling and analysis tasks. Ms. Huang will serve as the point of contact for USACE on all environmental chemistry and chemical quality control issues. Additional project and QC related qualification requirements, responsibilities, and authorities for the Project Chemist are detailed in the Project SAP.

2.5 FIELD SUPPORT STAFF

Field support staff, including project environmental samplers, report administratively to the Project Manager. Support staff will be responsible for conducting all project sampling tasks. Additional project and QC related qualification requirements, responsibilities, and authorities for the field support staff are detailed in the Project SAP.

2.6 PROJECT SUBCONTRACTORS

The project presently envisions use of subcontracted services for sample grid land survey, utility clearance, excavation and site restoration, compaction testing, transport and disposal of investigation derived waste, and analytical laboratory services. Subcontracted work will be conducted in accordance with the requirements of the contract, the approved work plans, subcontractor scopes of work, and the Project CQCP. Subcontractors shall meet the qualification requirements of Section 2.4.3 of the *Program Contractor Quality Control Plan* (ICF KE, 1998), and the provisions of Section 3.3 of this CQCP. A copy of the *Program Contractor Quality Control Plan* will be maintained onsite for reference during field activities.

3.0 PERSONNEL QUALIFICATION AND TRAINING

Project staff shall be qualified to perform their assigned jobs. This is accomplished by establishing and enforcing minimum qualification requirements for key positions, verifying initial and continued personnel proficiency, and where necessary, implementing a formal training program to achieve and maintain work related proficiency as outlined herein and in the TERC II-Standard Quality Procedure (SQP)-004, *Orientation, Indoctrination and Training*, which can also be found in the *Program Contractor Quality Control Plan*.

3.1 PROJECT QC STAFF QUALIFICATION AND TRAINING

Minimum qualifications for the CQC System Manager are provided in Table 3-1. Supplemental project QC personnel, if required to perform inspection activities during the course of the project, are to be qualified and certified by the CQC System Manager in accordance with established IT protocols for the QC function provided.

The project training program shall provide appropriate indoctrination regarding applicable contractual and corporate QC requirements, which shall be documented in accordance with requirements herein and TERC II-SQP-004. The primary focus for this quality indoctrination process shall be on QC program requirements and appropriate problem prevention within the USACE contractor quality control system.

The CQC System Manager will be responsible for providing quality control implementation and USACE QC protocol indoctrination and training on a formal and as-needed basis to IT staff assigned to the project.

3.2 KEY PROJECT STAFF QUALIFICATION & TRAINING

As members of the project staff, the Project Manager, Technical Manager, Project Chemist, and field support staff shall possess the minimum qualifications for their respective positions, as specified in the WP and TERC II Contract No. DACW05-96-D-0011.

In the event that additional assignments are made for this project, the qualifications of assigned personnel are to be evaluated and documented as prescribed herein.

Minimum qualification requirements for additional staff positions on this project shall be established by the CQC System Manager through review of contractual and other project-related requirements. CQC System Manager review and approval of the qualifications of proposed personnel against job qualifications is required before work may be conducted.

Senior technical staff are to provide newly assigned technical staff on-the-job training related to specific job requirements and techniques on an as-required basis. Particular emphasis shall be paid to problem prevention. Work performed by newly assigned staff shall be monitored by senior staff. The frequency of monitoring shall be dependent on the individual's demonstrated proficiency to perform assigned duties.

3.3 SUBCONTRACTOR QUALIFICATIONS

The CQC System Manager is responsible for verifying that subcontractors possess the requisite qualifications before procurement of such services. This shall be performed as prescribed in the *Program Contractor Quality Control Plan*. Anticipated subcontractor organizations and their respective roles relative to the project definable features of work are identified in Section 2.6 and Section 10 of this CQCP.

Subcontractors to IT shall not subcontract their responsibilities on this project to a third party or organization without prior and written approval of the IT Project Manager. Approval of IT subcontractors' further subcontracting responsibilities may require authorization of the Contracting Officer. Where required by work plan assignment or procurement document requirements, IT QC staff shall work with major subcontractors to ensure that the subcontractor develops and implements as a minimum supplier QC and internal training programs comparable to the ones specified in the *Program Contractor Quality Control Plan*.

3.4 SAFETY AND HEALTH TRAINING

Safety and health training requirements shall be established and implemented in accordance with IT policies and procedures specified in the SSHP. As a minimum, site workers and QC staff who may encounter hazardous wastes shall have completed the Occupational Safety and Health Act (OSHA) Hazardous Material Site Worker Training (40-hr initial training and 8-hr annual refreshers). Operations managers and the CQC System Manager shall have also completed the OSHA Hazardous Material Site Worker Training and 8-hour Supervisor Training.

OARB and UPRC personnel that have not completed OSHA training may be onsite during soil removal activities. These personnel will comply with direction from the Technical Manager onsite to ensure against exposure to potentially hazardous waste.

3.5 DOCUMENTATION

Except as otherwise specified in Sections 3.1 and 3.3 above, the review and verification of key project personnel qualifications shall be documented and verified by the CQC System Manager, or designee, on the Personnel Qualification Verification Form provided in Attachment B. Completed forms (one per key individual and function) and resumes for assigned project personnel (Project Manager, Technical Manager, CQC System Manager, Project Chemist, and Project Environmental Sampler) will be provided in Attachment B. If additional or replacement personnel are required for this project, a qualification form and resume will be added to this CQCP.

On-the-job training is to be documented using the IT Record of Skills and Experience, provided in Attachment A. Additional training and internal certification records are to be generated and retained by the organization or person giving the training/certification. Training records are to include the training syllabus, date(s), trainer(s), and attendees, and examination results (where applicable).

Certification records shall include the name of the certifying agent, the name of the individual certified, and the date and scope of certification.

4.0 CQC SYSTEM MANAGER

Mr. Reed's letter of assignment to the OARB project is included immediately following the cover page of the CQC Plan. Mr. Reed's designation and qualifications for the position of CQC System Manager have previously been submitted in a letter of authority to the USACE dated August 20, 1998 and approved.

The CQC System Manager will prepare letters of authority for all assigned QC staff. Specifically, this includes the designated CQC System Manager alternate, if required, and any other QC staff necessary to meet project QC line function and reporting requirements for the project definable features of work. These letters shall be signed by the CQC System Manager and shall describe QC staff functional responsibilities and delegated authority. A copy of each signed letter shall be provided to the USACE on-site representative and another copy shall be maintained in the project QC file. An example letter of authority is provided in Attachment A.

5.0 SUBMITTAL MANAGEMENT

Submittal management is a primary responsibility of project management and QC staff. Submittal control is required to regulate the timely flow of materials and work, to facilitate problem prevention, and to demonstrate that materials and work comply with applicable specifications. Project submittal procedures shall be implemented as prescribed herein and in accordance with contract delivery requirements.

5.1 GENERAL REQUIREMENTS

The Project Manager is responsible for overall management and control of project submittals. The Project Manager is responsible for submittal scheduling and tracking. The CQC System Manager shall be responsible for ensuring, through detailed review, that submittals, as well as the materials and work they represent, are in full compliance with applicable contract specifications. The CQC System Manager is also responsible for ensuring that a project file is established and maintained, and that accountable project documents are retained and controlled as prescribed herein.

5.1.1 Project Submittals

Submittals are to be listed and tracked using USACE Engineering Form 4288, Submittal Register (see Attachment A). Submittals include deliverables whether generated on-site or off-site by IT, subcontractors, fabricators, manufacturers, suppliers, or purchasing agents. Submittals for this project are expected to include a Construction Report and a Quality Control Summary Report (QCSR). The Construction Report will include a description of field activities, drawings of final excavation extents and sample collection locations, results of analytical testing, and results of waste management. The QCSR will include an analysis of data quality and a hard copy of all final, reviewed chemical laboratory comprehensive certificates of analyses.

The Submittal Register for this project, which has been initiated by IT, is included in Attachment C of this CQCP. Procurement documents for subcontracted services and materials shall list required subcontractor submittals. The CQC System Manager is to review the list to ensure its completeness and may expand general category listings to show individual entries for each item. The approved Engineering Form 4288 becomes the scheduling document and is to be used to control submittals throughout the project.

5.1.2 Project Records

An on-site project file will be established to include a record copy of the following documents:

- Work schedule and progress reports;
- Change orders and other contract modifications;
- Submittal register;
- Submittal records, including:
  - Soil and waste sample analysis results (comprehensive certificates of analysis)
  - Manifests, or Bills of Lading, for off-haul of waste
- Personnel qualification and safety certification records;
- Daily work activity summary reports, including:
  - Safety and Health Plan Daily Briefing Forms

- Reports on any emergency response actions,
- Survey records of sample grid land survey and utility clearance,
- Field activity daily logs,
- Field collected sample forms and annotated planned sample tables,
- Chain of Custody records,
- Reports on spill incidents,
- Excavation backfill compaction testing results,
- Daily subcontractor tracking logs,
- Photodocumentation,
- Laboratory results, and
- Other items as required by the Contracting Officer;

- Waste Management Records;
- Completed QC log books;
- Construction Report; and,
- Quality Control Summary Report.

Upon completion of site work activities, any field files shall be forwarded to the Program Office for future safekeeping and record management.

5.2 SUBMITTAL SCHEDULING

The Project Manager shall maintain a project submittal delivery schedule that reflects submittal dates and status on Engineering Form 4288. Submittal activities are to be incorporated into the project schedule so that submittal progress can be tracked in conjunction with overall progress. Submittal schedules shall allow for evaluation, approval, procurement, and delivery prior to the preparatory phase and before the deliverable is needed for work.

Interrelated submittals shall be scheduled and submitted concurrently. Adequate time shall be allowed for required reviews and approvals.

5.3 REVIEW AND APPROVAL OF SUBMITTALS

Prior to client delivery or use, project submittals are to be reviewed and approved by IT. The CQC System Manager is to review submittals prepared by IT, subcontractors, and suppliers for completeness and compliance with the specifications of the contract, project plans, Submittal Register requirements, and TERC Standard Operating Procedure (SOP) #17, *Document Control and Processing*.

Submittals related to construction equipment or materials are to be reviewed for contractual compliance. Prior to submittal to the CQC System Manager for certification, technical documents (e.g., reports, plans, and engineering drawings) are to be reviewed by qualified staff. Although part of the QC process, reviewers may include but are not limited to the QC staff. The CQC System Manager certification and signature are required for each submittal. Nonconforming submittals shall be returned to the originator for corrective action and re-submitted to the CQC System Manager for verification upon completion of approved corrective actions. Specific protocols and requirements for document and submittal review are prescribed in TERC-II-Standard Quality Procedure (SQP)-003, *Document Review*, included in the TERC II *Program Contractor Quality Control Plan*, and TERC SOP #17.

The distribution of TERC II-SQP-003, and all other SQPs, shall be controlled by the project document control process (reference TERC II-SQP-002, *Document Control)* to ensure that the most recent and approved versions are used for project work.

For each project document that is submitted for technical review, an IT Document Review and Release Form (see Attachment A and TERC II-SQP-003) shall be initiated by the author, submitted with the document to be reviewed, and used to document and track the review process. A copy of the completed Document Review and Release Form is to be submitted to the CQC System Manager together with the corrected document, and previous revision review comments, for review and certification. When a submittal is the result of response to USACE and other external review comments, an IT comment resolution document shall accompany the submittal, as well.

Submitted documents may also contain signature locations for CQC System Manager certification. Original Document Review and Release Forms, reviewer comments, comment resolution documents, and annotated document versions are to be retained with the deliverable in the project file for record keeping purposes and future reference.

5.4 TRANSMITTAL TO CLIENT

Submittals to the USACE are to be accompanied by Engineering Form 4025 (sample provided in Attachment A) and the completed Document Review and Release Form. Form 4025 shall be used for submitting both USACE "approval" and "information only" submittals, in accordance with the instructions on the reverse side of the form, and TERC SOP #17 guidance.

Form 4025 is to be properly completed by filling out the heading blank spaces and identifying each item submitted. Care is to be exercised to ensure proper listing of the submittal reference to contractual requirements, the submittal register number, and/or sheet number of the plans pertinent to the data submitted for each item. Once completed, Form 4025 will be signed by the CQC System Manager.

5.5 DOCUMENTATION

In addition to the documentation requirements specified above, the following requirements apply to this project.

- The QC file is to be maintained by the CQC System Manager and is to be controlled as an integral component of the project files;
- Shop drawings, work orders, and change orders, including Field Work Variances, issued during the course of the project are to be provided to the CQC System Manager. It is the responsibility of the CQC System Manager to maintain this technical information and keep it current and recorded as it is revised;
- Technical information is not to be replaced or revised without receipt of a properly authorized field work variance or revision. Copies of purchase orders or subcontracts requiring inspection are to be provided to the CQC System Manager for receiving and inspection planning purposes;
- Copies of required certifications received are to be maintained in the QC file and are to be submitted to USACE in accordance with agreements made at the coordination or other project technical planning meetings; and
- Changes in submittal progress and QC activities related to submittals are to be summarized in the Daily QC Report.

6.0 INSPECTION PHASES

The CQC System Manager is responsible for verifying compliance with this CQCP through implementation of the three-phase inspection control process

This inspection process ensures that project activities comply with the approved work plans, processes and procedures. Implementation of the inspection program requirements for the definable features of work for the project (see Section 10.0) is discussed in the following section, which also specifies minimum coordination, inspection and reporting requirements to properly monitor and document ongoing work processes.

6.1 IMPLEMENTATION OF THE THREE-PHASE INSPECTION PROCESS

The CQC System Manager shall ensure that the three-phase inspection control process is implemented for each definable feature of work listed in this CQCP, regardless of whether the work is performed by IT or its subcontractors.

Each control phase is important for obtaining a quality product; however, the preparatory and initial inspections are particularly valuable for preventing problems. Production work is not to be performed on a definable feature of work until successful preparatory and initial phase inspections have been completed.

6.1.1 Preparatory Phase Inspection

A preparatory phase inspection is performed prior to beginning each definable feature of work. The purposes are to review applicable work plans, processes, and specifications and verify that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. The CQC System Manager is to verify that lessons learned during previous, similar work have been incorporated as appropriate into the project procedures to prevent recurrence of past problems. The CQC System Manager shall generate and use a Preparatory Inspection Checklist. The generic checklist provided in Attachment A shall be customized to fit the specific scope of work and site conditions. Work plans and operating procedures are to be reviewed by the CQC System Manager to ensure they describe pre-qualifying requirements or conditions, equipment and materials, appropriate work sequences, methodology, hold/witness points, and QC provisions. The CQC System Manager shall verify that:

- The required plans and procedures have been prepared and approved and are available to the field staff;
- Construction materials meet required specifications;
- Field equipment is appropriate for intended use, available, functional, and calibrated;
- Work responsibilities have been assigned and communicated;
- Field staff have the necessary qualifications, knowledge, expertise, and information to perform their jobs;
- Arrangements for support services (such as on-site testing and off-site test laboratories) have been made; and
- Prerequisite site work has been completed.

Discrepancies between existing conditions and approved plans/procedures are to be resolved. Corrective actions for unsatisfactory and nonconforming conditions identified during a Preparatory Inspection are to be verified by the CQC System Manager or designee, prior to granting approval to begin work.

Client notification is required at least 48 hours prior to conducting preparatory inspections Results are to be documented in the preparatory inspection checklist, entered in the QC logbook, and summarized in the Daily QC Report.

6.1.2 Initial Phase Inspection

Performed the first time the definable feature of work is performed. The purposes are to check preliminary work for compliance with procedures and specifications, establish the acceptable level of workmanship, and check for omissions and resolve differences of interpretation. The CQC System Manager shall generate and use a Initial Inspection Checklist. The generic checklist provided in Attachment A shall be customized to fit the specific scope of work and site conditions. The CQC System Manager, or designee, is responsible for ensuring that discrepancies between site practices and approved specifications are identified and resolved. The CQC System Manager is to oversee, observe, and inspect all definable features of work at the project site, and to ensure that off-site activities, such as analytical testing, are properly controlled. Discrepancies between site practices and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the CQC System Manager or designee, before granting approval to proceed. Client notification for initial inspections is required at least 48 hours in advance. Results of initial inspections are to be documented in the initial inspection checklist, entered in the QC logbook, and summarized in the Daily QC Report.

6.1.3 Follow-up Phase Inspection

Performed each day the definable feature is performed. The purpose is to ensure continuous compliance and level of workmanship. The CQC System Manager is responsible for on-site monitoring of the practices and operations taking place and verifying continued compliance with the specifications and requirements of the contract, site work scope, and applicable approved project plans and procedures. The CQC System Manager is also responsible for reporting site safety and health activities prescribed in the SSHP. Discrepancies between site practices and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the CQC System Manager, prior to granting approval to continue work. Follow-up inspection results are to be documented in the QC logbook and summarized in the Daily QC Report.

6.1.4 Additional Inspections

Performed on the same definable feature of work; may be required at the discretion of the client or the CQC System Manager with approval by the client. Additional preparatory and initial inspections are generally warranted under any of the following conditions:

- Unsatisfactory work, as determined by IT or the client;
- Changes in key personnel;
- Resumption of work after a substantial period of inactivity (e.g., 2 weeks or more); and/or
- Changes to the project scope of work/specifications.

6.1.5 Completion/Acceptance Inspection

Performed upon conclusion of the feature of work prior to work acceptance or formal closeout, to verify that project requirements relevant to the particular feature of work are satisfied. Outstanding and nonconforming items are to be identified and documented in a checklist. As each item is resolved, it is to be so noted on appropriate checklists. USACE acceptance and closeout of each definable feature of work is a prerequisite to project closeout.

6.2 INSPECTION PROCEDURES

6.2.1 Receiving and Storage

The CQC System Manager, or designee, will inspect construction materials upon receipt and prior to use, when required by purchase order or the work plans. Visual inspection criteria include identification, signs of damage or distortion, completeness, evidence of compliance with specifications, and associated purchase order documentation requirements. Results of receiving inspections are to be documented in the QC log and summarized in the Daily QC Report.

6.2.2 Off-Site Control

Source inspections/qualification audits of off-site supplier facilities may be required for this project to ensure delivery of acceptable items, materials, and/or services. The CQC System Manager will notify the USACE on-site representative seven days in advance of conducting such activities. Results of supplier inspections/audits shall be reported using standard IT protocol.

6.2.3 Material Certification

Copies of purchase orders or subcontracts requiring receiving inspection are to be provided to the CQC System Manager, or designee, for scheduling and record-keeping purposes. If a purchase order requires vendor certification of materials, equipment, or supplies, the certification is to be verified as to accuracy and conformance and may be used in lieu of a test for those properties covered by the certification. Copies of certifications are to be maintained in the project QC file and made available to USACE upon request, or submitted as specified in the contract.

6.2.4 Inspection of Workmanship

Hold and witness points for determining the acceptability of project workmanship shall be identified on the IT Inspection Schedule and Tracking Form which shall be updated and maintained in accordance with Section 6.3 of this CQCP. Inspection criteria covering applicable workmanship standards shall be included in the three phase inspection checklists and results reported in the Daily QC Report.

6.2.5 Surveillance of Subcontractor Operations

The CQC System Manager shall be responsible for surveillance of project activities performed by subcontractors, as well as those performed by IT work forces. Discrepancies associated with subcontractor work are to be communicated to the subcontractor for resolution. The system outlined in Section 8.0 of this CQCP is to be followed. The CQC System Manager has the authority to act directly with subcontractor representatives on routine QC activities. If a discrepancy in workmanship will be obscured or covered by subsequent sequences of work operations, a resolution is to be made by project management and the CQC System Manager or designee prior to the item being covered.

6.3 DOCUMENTATION

The IT Inspection Schedule and Tracking Form (see Attachment A) is to be used by the CQC System Manager for planning inspections, designating hold and witness points in the inspection process, and for scheduling and tracking the progress of project inspections. The information on the form is to be kept up-to-date and reviewed by the CQC System Manager on a regular basis to keep inspection planning current.

Inspection activities and corrective actions are to be documented by the CQC System Manager as prescribed above, and in accordance with Section 8.0. Inspection records are to be maintained as part of the project QC file.

7.0 TESTING

Project sampling and testing may be accomplished by subcontracted forces, but compliance oversight of the project sampling and testing function shall remain the responsibility of the CQC System Manager.

7.1 ENVIRONMENTAL SAMPLING AND ANALYSES

Quality control and oversight reporting requirements for soil sampling and analytical testing for the project are covered in the SAP, Section 10.0.

7.2 CONSTRUCTION TESTS

Construction testing related to verification of the acceptability of construction materials used, or work performed during excavation, site restoration, or other project field activities is summarized in Table 7-1.

8.0 DEFICIENCY MANAGEMENT

IT's Quality Improvement Process (QIP) is comprised of the internal systems that evaluate the quality program's effectiveness for ensuring and continually improving the quality of project work. The primary goals of the QIP and the QC program defined in this document are to prevent nonconformances and facilitate continual process improvement.

To the extent that the first of these goals is not achieved, identified deficiencies or nonconformances are to be corrected in a timely and cost-effective manner, and with the intent of preventing future recurrence. This CQCP includes provisions for preventing quality problems and facilitating process improvements, as well as for identifying, documenting, and tracking deficiencies until appropriate corrective actions have been verified.

8.1 PREVENTIVE MEASURES

While the entire QC program is directed towards problem prevention, certain elements of the program have greater potential to be pro-active. The primary tools for problem prevention on this project and the specific references of where they are addressed include: Section 3.0, *Employee Qualification and Training*; Section 5.0, *Submittal Management*; and the preparatory and initial phase inspections of Section 6.0, *Inspection Phases*. Should these preventive measures fail, tracking and communicating deficiencies provides a mechanism for controlling nonconforming work and preventing its recurrence.

8.2 CONTINUAL IMPROVEMENT

Project staff at all levels are to be encouraged to provide recommendations for improvements in established work processes and techniques. The intent is to identify activities that are compliant but can be performed in a more efficient or cost-effective manner.

Typical quality improvement recommendations include identifying an existing practice that should be improved (e.g., a bottleneck in production) and/or recommending an alternative practice that provides a benefit without compromising prescribed standards of quality. Project staff are to bring their recommendations to the attention of project management or the QC staff through verbal or written means.

Deviations from established protocols are not to be implemented without prior written approval by the Project Manager and concurrence of the CQC System Manager. Any deviations from the established plan require a Field Work Variance which must be approved by the Contracting Officer or Contracting Officer's Representative. Staff-initiated recommendations resulting in tangible benefits to the project should be formally acknowledged by project management.

8.2.1 Deficiency Identification and Resolution

Deficiency identification and resolution are primary responsibilities of the operational staff (both IT and its subcontractors) and the Project Manager. In the interest of timeliness of corrective actions, a Corrective Action Request (CAR) can be issued by any member of the project staff - whether an IT or subcontractor employee.

If the individual issuing the CAR is also responsible for correcting the problem, then he or she should do so and document the results of corrective actions on Part B of the CAR. Otherwise, the CAR should be forwarded to the Project Manager designee (e.g., corresponding line manager), who is then responsible for evaluating the validity of the request, formulating a resolution and prevention strategy, assigning personnel and resources, and specifying and enforcing a schedule for corrective actions. Copies of validated CARs shall be forwarded to the CQC System Manager where they will be assigned a unique and sequential number and entered in the Deficiency Tracking Log.

Once a corrective action has been completed, the CAR and supporting information are to be forwarded to the CQC System Manager for verification and closure. Examples of IT CAR forms are provided in Attachment A.

While deficiency identification and resolution occurs primarily at the operational level, QC inspections provide a backup mechanism to address problems that either are not identified or cannot be resolved at the operational level.

Through implementation of the inspection program prescribed in Section 6.0, the QC staff is responsible for verifying that deficiencies are identified, documented as prescribed herein, and corrected in a timely manner. Deficiencies identified by the QC staff are to be corrected by the operational staff and documented by the QC staff.

In addition to observing actual work operations, CARs are to be reviewed during follow-up QC inspections. The purposes of this review are to ensure that established protocols are implemented properly, to verify that corrective action commitments are met, to ensure that corrective actions are effective in resolving problems, to identify trends within and among similar work units, and to facilitate system root cause analysis of larger problems. Particular attention is to be given by the QC staff to work units that generate either an unusually large or unusually small number of CARs.

At the request of the CQC System Manager, for major deficiencies, a written Corrective Action Plan (CAP) shall be developed by the Project Manager or designee to more formally document the corrective action and deficiency prevention process. Operational staff responsible for developing CAP responses should be encouraged to coordinate corrective action strategy with the QC staff throughout the process. The IT CAP Form is provided in Attachment A.

The CQC System Manager and designated staff have full stop-work authority for unresolved deficiencies.

8.3 DEFICIENCY AND CORRECTIVE ACTION TRACKING

Each CAR shall be tracked by the appropriate line manager until corrective actions have been taken and documented in Part B of the form, and the CAR is submitted to the CQC System Manager or designee for verification and closure. Sufficient information shall be provided to allow the QC reviewer to verify the effectiveness of the corrective actions. If the QC reviewer determines that corrective action is ineffective, or further action is required, the CAR shall remain open until acceptable action is taken.

Deficiency logs are to be reviewed periodically by the CQC System Manager to verify that corrective action commitments are met. Attachment A provides an example log. The QC Supervisor shall be responsible for distributing CAR updates to other project QC System Managers to support lessons learned across the TERC II Program, and for establishing and maintaining a CAR database for the project to facilitate trend analysis and to prioritize prevention initiatives.

8.4 DOCUMENTATION

Deficiencies are to be documented using CARs, CAPs, and the Daily QC Report. Minor deficiencies that are identified during a QC inspection but can be readily corrected and verified in the field are to be documented in the QC logbook and Daily QC Report.

Deficiencies identified in a QC inspection but that cannot be readily corrected are to be documented by the QC staff on the appropriate CAR, and referenced and attached in the Daily QC Report as warranted for project deficiency notification and informational purposes.

9.0 REPORTS

9.1 DAILY QUALITY CONTROL REPORT

The CQC System Manager is responsible for the preparation and submission of the Daily QC Report to the USACE Project Manager, or Con Ops representative (if available) with concurrent courtesy copies to the Project Manager. The original of the Daily QC Report with attachments is to be submitted to the USACE Task Manager within one week of completion of field activities.

All calendar days, including weekends and holidays, are to be accounted for throughout this project. At a minimum, one report is to be prepared and submitted for every continuous seven days of no work.

The Daily QC Report shall provide an overview of QC activities performed each day, including those performed on subcontractor and supplier activities. The QC reports shall present an accurate and complete picture of QC activities accomplished and forecast. They should report both conforming and deficient conditions, and should be precise, factual, legible, and objective. Copies of supporting documentation, such as checklists, test reports, CARs, and surveillance reports shall be attached. The format to be used is provided in Attachment A.

A field QC logbook is to be assigned to the CQC System Manager and each member of the QC staff for use in documenting details of field activities during QC monitoring activities. The information in the QC logbook is intended to serve as a telephone log and memory aide in the preparation of the Daily QC Report and in addressing follow-up questions that may arise.

Chemical QC and Safety and Health staff input for the Daily QC Report is to be provided in writing to the CQC System Manager at a previously agreed upon time and place, generally no later than about one hour before normal close of business. For the sake of simplicity and completeness, the format for QC staff input should follow the same as for the Daily QC report with only the relevant sections completed.

Daily QC Reports and QC logbooks used on this project are project records, subject to the restrictions specified in the *TERC II-SQP-002*. Unless otherwise agreed upon in project coordination or technical meetings, each Daily QC Report is to be assigned and tracked by a unique number comprised of the project number followed by the WAD number followed by the date expressed as YYYY/MM/DD. In the case of "no work day" reports, the report number is to comprise the project number, the last date covered, the number of days covered, and the initials "NW." For example, 870501-04-20000924 would be the daily report number related to site work at OU2 performed on 24 September 2000, and 870501-04-20000927-2NW is the report for this task order related to two no work days from 26 September 2000 through 27 September 2000. Copies of Daily QC Reports with attachments and QC logbooks no longer in use are to be maintained in the project QC file. Upon project closeout, all QC logs are to be included in the project QC file.

9.2 COMPLETION REPORTS

The Project Manager is responsible for preparation and submittal of a Construction Report (CR) and a QCSR to the USACE. The Project Chemist is responsible for preparation and submittal of the chemical quality portions of the CR and the QCSR. The CR and the QCSR shall provide an overview of both chemical and field QC activities performed during the course of sampling activities.

10.0 DEFINABLE FEATURES OF WORK

Table 10-1 lists the definable features of work governed by this CQCP. For each feature of work, Table 10-1 identifies the scheduled activity number, SOP or work document reference number, and assigned responsibility.

11.0 REFERENCES

ICF Kaiser, 1996. *ICF Kaiser TERC II Contract, DACW05-96-D-0011.*

ICF Kaiser, November, 1998. *TERC II Program Contractor Quality Control Plan, DACW05-96-D-0011.*

IT Corporation, 2000. *Removal Action Work Plan for OU2 Soil at Oakland Army Base, Revision 0.* Oakland, California. May.

USACE. *Contractor Submittal Procedures, USACE ER 415-1-10.*

USACE, Sacramento District. *TERC Management SOPS*

USACE, 1994. *Construction Quality Management for Contractors: Student Study Guide.* USACE Nontraditional Training and Planning Division. June.

USACE, 1994. *Construction Quality Management, USACE ER 1180-1-6.* June.

TABLES

Table 3-1: Construction Quality Control System Manager Minimum Qualifications
OU2 Soil Removal, Oakland Army Base, Oakland, California

Position	Reports To	Minimum Qualifications	Position Description
CQC System Manager and Alternate	TERC II Quality Control Supervisor	• Graduate engineer or graduate of construction management with a minimum of four years environmental engineering experience, or an experienced construction person with a minimum of eight years experience in related work. • Nine semester hours, 12 continuing education units (or combination thereof) education, and two years experience in specialized areas, e.g., RI, RD and RA. • Working knowledge of applicable federal, state, and local laws, regulations, and guidance. • Physically able to be on-site during field activities. • OSHA Hazmat Site Work Training 40 hour, eight hour Supervisor training.	• Manages quality verification services and activities. • Performs quality verification services and activities within scope of qualification and in conformance with approved procedures. • Directs day-to-day activities of QC staff. • Can stop work for cause. • Prepares project QC budgets. • Prepares and submits Daily QC Reports. • Maintains QC records file over the life of project activities. • Formulates and implements, as required, the written procedures and instructions contained in the CQCP. • Verifies the qualifications of the QC staff. • Coordinates with the Project Manager to assure compliance with contractual and project specific requirements. • Coordinates the QC efforts of, and communicates directly with, subcontractors and suppliers to comply with the CQCP. • Provides feedback to USACE on QC matters. • Verifies shop drawings and other submittals. • Accounts for discrepancies in the quality of all items.

Table 7-1: Construction Test Plan
OU2 Soil Removal, Oakland Army Base, Oakland, California

Item/Work Plan Reference	Test Name and Procedure	Test Frequency	Approximate Number of Tests	Tests Conducted By
Backfill Material / WP Section 3.10	Material Classification testing, ASTM D 2487 Material Particle Size Analyses testing, ASTM D 422	1 test per source	1	Subcontracted geotechnical services
Backfill Compaction / WP Section 3.10	Laboratory Moisture – Density Tests, ASTM D 1557, Procedure C	1 test per type of material	1	Subcontracted geotechnical services
	Field In-Place Density of Soil, ASTM D 1556; or,	1 test per each lift placed	10	Subcontracted geotechnical services
	Field In-Place Density of Soil, ASTM D 2167; or,	1 test per each lift placed	10	Subcontracted geotechnical services
	Field In-Place Density of Soil, ASTM D 2922 with calibration curves adjusted by the sand cone method, and moisture content checked by ASTM D 3017	1 test per each lift placed Check calibration of density and moisture gages at beginning of job, and per source. Perform one test by ASTM D 1556 per every 10 tests by ASTM D 2922	10	Subcontracted geotechnical services
Underground Utility cutting and capping / WP Section 2.3	Cutting and capping of natural gas lines, water lines, storm drainage lines, sump drain lines, and/or sanitary sewer lines (Procedure TBD)	TBD	TBD	Construction subcontractor

Checked by / date:
________________ / ________

Approved by / date:
________________ / ________

Table 10-1: Contractor Quality Control Plan Definable Features of Work
OU2 Soil Removal, Oakland Army Base, Oakland, California

Feature No.	Definable Feature Of Work	Responsible Organization	Work Document Reference
1	Surveys: Sample grid land survey, and Utility clearance survey	IT / Survey subcontractor	WP, Sections 2.1.4 and 2.2
2	Site preparation	IT / Subcontractor	WP, Sections 2.1.2 and 2.4
3	Washrack sump and drain line clearing and grouting	IT / Subcontractor	WP, Section 2.3
4	Soil Sample Collection, Handling and Shipment	IT / Subcontractor	WP, Section 2.2 / SAP Sections 7.1 - 7.4
5	Sample Analysis	IT / Subcontract Laboratory	SAP, Section 8.0
6	Data review, validation and QCSR	IT / Synectics	SAP, Section 9.0
7	Excavation and waste management	IT / Subcontractor	WP, Sections 2.5 - 2.6
8	Waste characterization, profiling, transportation and disposal	Subcontract Laboratory	WP, Section 2.9
9	Site Restoration	IT / Subcontractor	WP, Section 2.8
10	Construction Report	IT	WP, Section 3.0

Checked by / date: ____________________/__________

Approved by / date: ____________________/__________

ATTACHMENT A

PROJECT QUALITY FORMS

I.	Personnel Qualification Verification Form
II.	Record of Skills and Experience Form
III.	Sample Letter of Authority
IV.	Form 4288 Transmittal Register
V.	Document Review and Release Form
VI.	Form 4025 Transmittal
VII.	Inspection Schedule and Tracking Form
VIII.	Preparatory Inspection Checklist Form
IX.	Initial Inspection Checklist Form
X.	Corrective Action Request (CAR)
XI.	Corrective Action Plan (CAP)
XII.	Deficiency Tracking Log
XIII.	Daily Quality Control Report (DQCR)

PERSONNEL QUALIFICATION VERIFICATION FORM

CANDIDATE: *Name*
CONTRACT: DACW05-96-D-0011 (TERC II)

POSITION:

REVIEW ITEMS		CANDIDATE QUALIFICATIONS	VERIFIED BY/DATE
EXPERIENCE	REQUIRED: AREA AND YEARS		
	ACTUAL: AREA AND YEARS		
EDUCATION	REQUIRED		
	ACTUAL		
CERTIFICATIONS & REGISTRATIONS	REQUIRED		
	ACTUAL		
TRAINING	REQUIRED		
	ACTUAL		
OTHER	REQUIRED		
	ACTUAL		

ICF KAISER

RECORD OF SKILLS AND EXPERIENCE

NAME & PAYROLL NO:	YR. JOINED ICF:	DEGREE(S) AND YEAR:	CERTIFICATIONS/REGISTRATIONS & YEAR:

AREAS OF SPECIALIZATION

- ☐ DRILLING/SOIL SAMPLING
- ☐ WELL INSTALLATION
- ☐ WFLL DEVELOPMENT
- ☐ AQUIFER TESTING
- ☐ QUALITY CONTROL
- ☐ GROUNDWATER SAMPLING
- ☐ SURFACE SOIL SAMPLING
- ☐ SURFACE WATER SAMPLING
- ☐ SEDIMENT SAMPLING
- ☐ ____________
- ☐ WETLANDS DELINEATION
- ☐ GEOPHYSICAL SURVEYS
- ☐ SOIL GAS SURVEYS
- ☐ FIELD GC ANALYSIS
- ☐ ____________

ON-THE-JOB TRAINING AND EXPERIENCE					
DATE	SITE	DUTIES AND NEW RESPONSIBILITIES	MENTOR	REV/D SOPS?	VERIFIED

II. RECORD OF SKILL ND EXPERIENCE FORM (cont'd)

Name: Payroll No: Page

ON-THE-JOB TRAINING AND EXPERIENCE					
DATE	SITE	DUTIES AND NEW RESPONSIBILITIES	MENTOR	REV/D SOPS?	VERIFIED

III. SAMPLE LETTER OF AUTHORITY

[DATE]

MEMORANDUM

To: *[Name]*

From: *[Name]*, TERC II Quality Control Supervisor

Copy To: *[Name]*, Project Manager
[Name], Program Manager

Subject: Delegation of Authority for CQC System Manager

Reference: USACE Contract Number DACW05-96-D-0011 (TERC II)

This letter confirms your assignment as the Contractor Quality Control (CQC) System Manager for the *[CTO - Name]* TERC II projects under the above referenced contract. You will have overall responsibility for remediation, construction, and chemical quality control for site activities, and have the responsibility *and* authority to act in all Project CQC matters for IT Corp. Initially, you are responsible for the maintenance, further development, and implementation of the site-specific Contractor Quality Control Plans (CQCPs), and shall participate in any coordination and other appropriate quality planning meetings with USACE representatives. Specific instructions and requirements for your responsibilities on-site are found in the *[CTO - Name]* Project CQCPs, the Program CQC Plan for Sacramento TERC II, (Document Control Number, ACE01-228-H), and the referenced contract.

You are authorized to identify and use the necessary resources to satisfy the requirements of the work planning and quality control documents for the *[CTO - Name]* projects. You are specifically authorized to control nonconforming work, and may exercise stop work authority, if required. You are to be on-site as necessary during the construction and remediation periods, except for periods when your designated alternate or representative may assume your responsibilities. You are expected to work closely with the IT Corp. Project Manager and *[CTO - Name]* Technical Managers, but you will not be directly responsible to anyone but myself.

A copy of this Delegation of Authority memorandum with your signature of concurrence below will be included in the Project CQCPs at *[CTO - Name]*.

Concurrence:

______________________________ ________________

[Name] Date

IV. FORM 4288 S TTAL REGISTER

SUBMITTAL REGISTER
(ER415 1-10)

Page 1 of 1

Contract No.: DACW05-96-D-0011

DO/WAD:

Contractor: IT Corporation

Title and Location:

Activity No	Transmittal No	Item No	Specification Paragraph No	Description of Item Submitted	Type of Submittal: Data	Drawings	Instructions	Schedules	Statements	Reports	Plans/Programs	Certificates	Samples	Records	Other	Classification: Information Only	Government Approval	Reviewer	Contractor Schedule Dates: Submit	Approva	Material Needed	Contractor Action: Code	Date	Submit To Gov.	Government Action: Reviewer	Code	Date	Remarks

IT Corp. ____________ Date

USACE Approval ____________ Date

the group

V. DOCUMENT REVIEW & RELEASE FORM

DOCUMENT REVIEW & RELEASE FORM

Current Date ______________________ Deliverable Due Date ______________________

Job No ______________________ Project Name ______________________

Program Manager ______________________

Document Type [ ] Draft Deliverable [ ] Final Deliverable [ ] Engineering Specifications

[ ] Project Plan/Procedure [ ] Technical Report [ ] Progress/Financial Report

[ ] Other: ______________________

Document Subject/Title: ______________________

Author(s) ______________________

Review Schedule

Reviewer	Review Type *	Date/Time Review Needed	Date/Time Review Completed

* Full, Technical Engineering Management, or Other: ______________________

Review Results:

Reviewer					
Disposition:	(check one)	(check one)	(check one)	(check one)	(check one)
No Exception Taken	[ ]	[ ]	[ ]	[ ]	[ ]
Exceptions as Noted	[ ]	[ ]	[ ]	[ ]	[ ]
Revise as Noted and Resubmit	[ ]	[ ]	[ ]	[ ]	[ ]

Approval for Release (Signature and Date):

PM: ______________________ Project CQCSM: ______________________

Program QC Sup : ______________________

VI. FORM 4025 _ANSMITTAL FORM

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE	TRANSMITTAL NO.

SECTION 1 - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by contractor)

TO:	FROM:	CONTRACT NO.	CHECK ONE:
Fred Strickland, Contracting Officer U. S. Army Corps of Engineers 1325 "J" Street Sacramento, CA 95814	IT Corporation 4005 Port Chicago Hwy Concord, CA 94520	DACW05-96-D-0011 CTO / WAD	☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL ______

SPECIFICATION SEC. NO. (Cover only one section with each transmittal)	PROJECT TITLE AND LOCATION:

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE, DRAWING OR BROCHURE NO. (See instruction No. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA. NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction No. 6) h.	FOR CE USE CODE i.

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

ICF KAISER

INSPECTION SCHEDULE & TRACKING FORM

Project:	Project Manager:	CQC System Manager:

Reference Number	Definable Feature of Work	Preparatory		Initial		Follow-up		Completion		
		Date Planned	Actual Date	Date Planned	Actual Date	Planned Begin/End	Actual Dates	Planned Begin/End	Actual Dates	Status

STATUS KEY: = Prep Completed Θ = Initial Completed (|) = Follow-up In Progr. (|)→ # = Additional Prep/Initial, New Ref # ● = Accepted

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VIII. PREPARATORY INSPECTION CHECKLIST FORM

PREPARATORY INSPECTION

Contract No: DACW05-96-D-0011	**Date**:
Scope of Work:	**CTO / WAD:**
Definable Feature(s) of Work:	**Specification Reference**:

Notifications: Notify USACE 48 hours in advance of site activities

I. Personnel Present

√ See attached Meeting Sign-in Sheet.

II. Submittals

Have all subcontractor submittals been approved?

√

√

If not, what items have not been submitted?

Are all materials on hand?

√

√

If not, what items are missing?

Is necessary equipment to perform work available?

√

√

If not, what discrepancies are found?

III. Material Storage

Are materials stored properly?

√

√

If not, what action is taken?

the igroup

VIII. PREPARATORY INSPECTION CHECKLIST FORM

PREPARATORY INSPECTION

IV. Specifications

Required Action	*Comments*
Review SOW sections for each feature of work.	
Discuss procedure for accomplishing work	
Clarify any differences	

V. Preliminary Work Permits

Ensure preliminary work is correct and permits are on file.

√

√

If not, what action is taken?

VI. Testing

√ Is test plan complete and accurate?

√

What actions still need to be taken?

VII. Safety

√ Assure safety tailgate meetings will be daily.

√ Verify how safety will be directed and handled

√ Activity Hazard Analysis approved?

√

the *igroup*

VIII. PREPARATORY INSPECTION CHECKLIST FORM

PREPARATORY INSPECTION

VIII. Organization

Are responsibilities clearly spelled-out for organizational members in the plans?

√

√

IX. CQC Comments

X. Client Comments

CQC Representative Signature/Date: ______________________/______________

the group

IX. INITIAL INSPECTION CHECKLIST FORM

INITIAL INSPECTION CHECKLIST

Contract Number:	**Date:** **Location:**
Scope of Work:	**Project Number: CTO: WAD:**
Definable Features of Work:	**Specification References:**
Notifications: Notify USACE 48 hours in advance of site activities	

I. Personnel Present

Name	*Position*	*Affiliation*

II. Preparatory Inspection

√ Verify full compliance with procedures identified at preparatory inspection Coordinate plans, specifications, and submittals, if applicable

√ Identify any problems that must be resolved before starting work.

Comments:

III. Preliminary Work

√ Is all preliminary work (work which must be completed before beginning definable features of work) complete and correct?

√ Has safety meeting been held?

√ Demonstrate equipment calibrations in accordance with scope of work accuracy and precision requirements before surveying activities

Comments:

IX. INITIAL INSPECTION CHECKLIST FORM

INITIAL INSPECTION CHECKLIST

IV. Level of Workmanship

√

V. Discrepancies

√ Are there any discrepancies between planned events and actual conditions and/or practices?

√ Have these discrepancies been noted; what actions were taken as a result of such conditions?

√ Are there any discrepancies, nonconforming conditions, or other deficiencies encountered with site activities, which require correction before continuing site sampling activities?

Comments:

VI. Safety

√ Review prevailing job conditions against governing safety documents and expected conditions before proceeding with initial site demonstrations and work.

√ Verify appropriate PPE and safety monitoring equipment is available and operational.

√ Attach daily safety tailgate meeting notes to Daily QC Report; include this Initial Inspection Checklist.

Comments:

VII. Client Comments/Direction

CQC Representative Signature / Date: ______________________________ /____________

X. Corrective Action Request Form

TERC II CORRECTIVE ACTION REQUEST

CAR NUMBER:	
PRIORITY: [ ] HIGH	[ ] NORMAL
DATE PREPARED:	

PART A: NOTICE OF DEFICIENCY.

PROJECT:	CTO:	WAD:
PROJECT MANAGER:	CQC SYSTEM MANAGER:	
WORK UNIT:	WORK UNIT MANAGER:	
ISSUED TO (INDIVIDUAL & ORGANIZATION):		
REQUIREMENT & REFERENCE:		
PROBLEM DESCRIPTION & LOCATION: CAP REQUIRED? [ ] YES [ ] NO	RESPONSE DUE:	
ISSUED BY (PRINTED NAME & TITLE): SIGNATURE:	DATE:	MANAGEMENT CONCURRENCE:

PART B: CORRECTIVE ACTION.

PROPOSED CORRECTIVE ACTION/ACTION TAKEN: See attached response to Corrective Action Request. NOTE: SUPPORTING DOCUMENTATION MUST BE LISTED ON THE BACK OF THIS FORM AND ATTACHED.		
PART B COMPLETED BY (PRINTED NAME & TITLE): SIGNATURE:	DATE:	QC CONCURRENCE:

PART C: CORRECTIVE ACTION VERIFICATION.

CAR VERIFICATION & CLOSE-OUT: (CHECK ONLY ONE & EXPLAIN WHERE NEEDED) [ ] APPROVED FOR CLOSURE WITHOUT STIPULATIONS: [ ] APPROVED FOR CLOSURE WITH STIPULATIONS: COMMENTS: CLOSED BY (PRINTED NAME & TITLE): SIGNATURE:	DATE:

the igroup

XI. CORRECTIVE ACTION PLAN FORM

CORRECTIVE ACTION PLAN (CAP)

Attach clarifications and additional information as needed Identify attached material in appropriate section of the CAP

PART A: TO BE COMPLETED BY PROJECT MANAGER OR DESIGNEE.

PROJECT:		
PROJECT MANAGER:	CQC SYSTEM MANAGER:	
CAR NO(S) & DATE(S) ISSUED:		
DEFICIENCY DESCRIPTION & LOCATION:		
PLANNED ACTIONS	ASSIGNED RESPONSIBILITY	COMPLETION DUE DATE
PROJECT MANAGER: SIGNATURE:	DATE:	

PART B: TO BE COMPLETED BY CQC SYSTEM MANAGER OR DESIGNEE.

CAP REVIEWED BY:	DATE:
REVIEWER COMMENTS:	
CAP DISPOSITION: (CHECK ONLY ONE & EXPLAIN WHERE NEEDED) [ ] APPROVED WITHOUT STIPULATIONS [ ] APPROVED WITH STIPULATIONS: [ ] APPROVAL DELAYED, FURTHER PLANNING REQUIRED: COMMENTS:	
CQC SYSTEM MANAGER SIGNATURE:	DATE:

XII. CAR TRACKING LOG FORM

CAR TRACKING LOG

PROJECT:	WORK UNIT:
WORK UNIT MANAGER:	CQC SYSTEM MANAGER:

CAR NO.	ISSUED TO	DATE ISSUED	DISPOSITION

Report No :
Page: 1 of 3

DAILY QUALITY CONTROL REPORT

USACE TECHNICAL MANAGER:
PROJECT:
CTO/WAD NO.:
CONTRACT NO.:

DAY OF THE WEEK

S	M	T	W	TH	F	S

WEATHER CONDITIONS

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP: H/L	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moderate	High	Report No : __	
HUMIDITY	Dry	Moderate	High		

1. Contract/Subcontractor Personnel and Areas of Responsibility:

Number	Trade	Hours	Employer	Location & Description of Work

2. Operating Plant or Equipment (Not hand tools):

Plant / Equipment	Subcontractor Equipment? (Y / N)	Date of Arr. / Dep.	Date of Safety Check	Hours Used	Hours Idle	Hours Repair

3. Work Performed Today: (Indicate location and description of work performed by prime and/or subcontractors. When network analysis is used, identify work by NAS activity number.

Activities Conducted
√

Report No.:
Page: 2 of 3

DAILY QUALITY CONTROL REPORT

Activities Conducted

4. **Control Activities Performed: (Specify feature of work/NAS number and indicate whether P for Preparatory, I for Initial, or F for Follow-up Phase. For <u>Preparatory</u> Inspections: Identify feature of work and attach completed checklist, list RFIs issued and responses. For <u>Initial</u> Inspections: Identify feature of work and attach completed checklist. For <u>Follow-up</u> Inspections: List inspection milestones reached (hold/witness points), inspections performed, results of inspection compared to specification requirements, CARs issued/closed, and corrective actions taken.)**

√

5. **Tests Performed and Test Results: (Identify test requirements by paragraph number in specifications and/or sheet number in plans).**

√

6. **Material Received: (Note inspection results and storage provided).**

√

7. **Submittals Reviewed:**

Submittal No.	Spec/Plan Reference	By Whom	Action

8. **Off-site Surveillance Activities, including Action Taken:**

√

9. **Job Safety: (List items checked, results, instructions and corrective actions taken).**

√

DAILY QUALITY CONTROL REPORT

10. Remarks: (Instructions received or given. Conflict(s) in plans and/or specifications. Delays encountered).

√

11. List of Attachments: (List all attachments to this report, include date and reference number where applicable. Attachments are to include copies of inspection checklists, test reports, data reports, and field measurement/calculation sheets.)

√

Contractor's Verification: On behalf of IT Corp., I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as may be noted above

CQC System Manager

Date

ATTACHMENT B

RESUMES AND QUALIFICATION FORMS

1.	Project Manager	-	Ms. Nora Okusu
2.	Technical Manager	-	Mr. Bruce Haymaker
3.	CQC System Manager	-	Mr. Michael Reed
4.	Project Chemist	-	Mr. Susan Huang
5.	Site Safety & Health Officer	-	TBD
6.	Project Environmental Sampler	-	TBD

NORA M. OKUSU

EDUCATION

1988	M.S., Mechanical Engineering, University of California at Berkeley
1984	S.B., Mechanical Engineering, Massachusetts Institute of Technology

PROFESSIONAL REGISTRATION

Registered Engineer-in-Training, Commonwealth of Massachusetts, 1985.

EXPERIENCE

Ms. Okusu has 15 years of experience in remedial investigations and feasibility studies, engineering design, construction management, regulatory compliance, and research in groundwater hydrology and reservoir engineering. Ms. Okusu has managed a variety of projects for both DOD and private sector clients. She has been the project manager for three remedial design projects; a 600-gpm groundwater treatment system, a 960-gpm groundwater treatment system, and an innovative cover system for an explosives and chemical agent landfill. In addition, she has conducted environmental audits of industrial facilities. Prior IT Corporation, she worked for a State regulatory agency as a project manager in the Superfund remedial program; performed research in groundwater flow and geothermal reservoir analysis in the Earth Sciences Division of Lawrence Berkeley Laboratory; and worked on oil and natural gas well stimulation projects for Resources Engineering Systems, Inc. Ms. Okusu received her M.S. in mechanical engineering from the University of California at Berkeley in 1988 and her S.B. in mechanical engineering from the Massachusetts Institute of Technology in 1984. She is a Program Manager with IT Corporation; her experience includes the following:

Business Unit and Contract Management

- Business Unit manager for office in Edgewood, MD, from October 1998 to May, 1999. Responsible for 83 staff and approx. $40 million in annual revenue. Helped to expand office into private sector environmental market.
- Business Unit manager for office in Savannah, GA, from initial opening in January 1996 to August 1999. Responsible for up to 10 staff and approx. $3 million in annual revenue. Previously worked in Fairfax, VA, and Abingdon, MD, offices.
- Program Manager for multi-year Environmental Services Program Support (ESPS) contract and Total Environmental Program Support (TEPS) contract with the U.S. Army Corps of Engineers, Baltimore District. Both are cost-reimburable contracts with values of $30 million. Negotiated task orders and modifications.
- Project Engineer/Project Manager for multi-year, indefinite delivery type contract with the U.S. Army Corps of Engineers, Savannah District. Marketed contract, developed all fee proposals, negotiated delivery orders (19 to date, $9 million in total revenue). Work has been performed in

four states and Puerto Rico Projects include environmental audits, remedial investigations, feasibility studies, risk assessment, design, construction and O&M of treatment systems, and other environmental services.

- Project Engineer for multi-year, fixed price contract with the U.S. Army Corps of Engineers, Mobile District. Work consists of environmental investigations, design, and post-design support. Total contract value: $2.4 million. Project is 75% complete.

Project Management

- Managed design/build of a low level radioactive waste sorting facility at the Savannah River Site under contract to Bechtel Savannah River, Inc. Supervised design and performed all on-site construction management Facility consists of a stainless steel primary containment building, a steel secondary containment building, three-station glovebox for waste sorting, and HEPA filtration system. The schedule included a six-week design phase and 10-week construction phase (to mechanical completion.) Successfully met project milestones. Gross revenue: $904,000. Received letter of commendation from Westinghouse Savannah River Co. project manager.
- Under four contracts, managed RI/FS, design, and post-design support at Milan Army Ammunition Plant, Tennessee. Total revenue: $15.1 million over 8 years (project is 84% complete). To date, work has resulted in five Records of Decision: three groundwater treatment systems, a multi-media cap extension, and a soil bioremediation facility. Managed detailed design of 600-gpm groundwater treatment system consisting of electrochemical precipitation, ultraviolet oxidation, and granular activated carbon treatment units. Managed detailed design of 960-gpm groundwater treatment system consisting of multi-media filtration and granular activated carbon filter beds; currently managing design of similar 1,300-gpm system. Received two letters of commendation from the U.S. Army, letter of appreciation from the U.S. EPA Region IV Regional Administrator, and the Commander's Coin from the Milan Army Ammunition Plant commanding officer.
- Managed RI/FS and detailed design work at O-Field, Aberdeen Proving Ground, MD. Developed SOPs to safely perform environmental investigation work in the presence of live ordnance and chemical warfare materials. Assisted in 30% design of groundwater treatment system for the removal of VOCs, explosives compounds, and chemical warfare material degradation compounds. Managed detailed design of innovative cover system for Old O-Field, which is a landfill containing chemical warfare materials both in bulk quantities and in ordnance, high explosive ordnance, and chemicals used in decon activities.
- Project Manager for design, installation, and O&M of groundwater treatment system at Redstone Arsenal, AL. System consists of extraction wells installed in fractured bedrock and a low-profile air stripper to remove VOCs.
- Project Manager for remedial work at Tarheel Army Missile Plant, NC. Work includes decontamination for release of former Isotope Room, which contains low levels of Cs-137 contamination. Other tasks: retrofilling of PCB-contaminated electrical equipment and evaluation of groundwater treatment systems.

- Project Manager for Oakland Army Base under the US Army Corps of Engineers Sacramento TERC Contract from November 1999 to the present. Work includes RI/FS of 26 BRAC parcels, UST/AST removals, and remediation of contaminated soil. Total project revenue: $9 million to date.

Environmental Field Investigations

- O-Line Ponds, Milan Army Ammunition Plant, Milan, TN. Under a fast-track schedule, performed bench- and pilot-scale treatability studies to evaluate performance of UV-oxidation and electrochemical precipitation in treating explosives- and metals-contaminated groundwater. Performed large-scale aquifer tests to design groundwater extraction and effluent re-injection systems. Negotiated Record of Decision with USEPA Region IV and State of Tennessee. To evaluate the need for active remediation of the source area, additional boreholes were drilled through the clay cap covering the former settling lagoons On-site soil analysis using colorimetric techniques was used to provide a quick-turnaround evaluation of the levels of contaminants encountered while drilling. Evaluated potential remedies for contaminated soil. Negotiated Proposed Plan and Record of Decision for RCRA cap extension remedy. Developed conceptual design of cap extension using a combination of synthetic and natural materials to reduce the need for further excavation of contaminated soil

- Fort George G. Meade, MD. Project manager for the remedial investigation and feasibility study of four landfills and a 9,000-acre range area formerly used for combat tank and artillery testing.

- RCRA Facility Assessment of a Solvent-Contaminated Site, Private Confidential Client. Ms. Okusu was the site manager for the RFA of a site contaminated through past waste management practices. Managed the drilling and coring of boreholes, installation of monitoring wells, collection of samples for chemical analysis, and geophysical and soil gas surveys.

- Hydrogeologic Investigation of a Solvent-Contaminated Site, Private Confidential Client. Ms. Okusu supervised the drilling of soil boreholes, collection of soil samples for chemical analysis, and installation of monitoring wells. She also assisted in the interpretation of both chemical and hydrologic data to determine the feasibility of groundwater treatment options.

- Environmental Audits of Industrial Facilities. For several clients, Ms. Okusu has assisted in identifying current and potential environmental compliance problems at industrial facilities. This work involves background research into the facility history, developing an understanding of the processes used, an inspection of the plant, interviews of current employees, and the generation of a report.

Regulatory Project Management

- Superfund Sites in the Virginia Remedial Program. While working for a State regulatory agency, Ms. Okusu was a project manager for six CERCLA sites, both State lead and U.S.

EPA lead. This work included reviewing and revising work plans for RI/FS and remedial actions, conducting field sampling activities, and selecting treatment technologies. Ms. Okusu has extensive knowledge of CERCLA/SARA and Federal and State regulations concerning the quality of groundwater, surface water, soil, and air.

- Groundwater Modeling Study of the Saunders Supply Company NPL Site. Ms. Okusu was the project manager for a University group that was developing a groundwater flow and contaminant transport model of a Superfund site The model will be used in performing the risk assessment and in remedial action selection and design.

Hydrologic Research

- Yucca Mountain Project. Ms. Okusu developed numerical models of fluid flow in unsaturated, fractured rock for a high-level nuclear waste repository. She conducted extensive testing and modification of a two-dimensional double-permeability flow model. The model is capable of simulating fluid flow and heat transfer through naturally fractured rocks with exchange between the fracture system and rock matrix.

- The Geysers Geothermal Field, California. Ms. Okusu assisted in the development of a computer model of reservoir performance for this large-scale, currently operating geothermal field. She performed the reservoir characterization of the field by analyzing flow, pressure, and lithology data.

- Department of Energy Enhanced Oil Recovery Project. As a graduate student, Ms. Okusu developed semi-analytical models of two-phase flow in porous media for both Newtonian fluids and gas/liquid dispersions. The model includes the effects of gravity and capillarity.

Oil and Natural Gas Well Stimulation

- Hydraulic Fracturing Operations--Computer Modeling. Ms. Okusu assisted in the development of computer models of hydraulic fracture growth. She wrote a computer model for the transport of sand in a hydraulic fracture during fracture creation; developed a computer model to calculate the pressure distribution in pipes for non-Newtonian flow; and developed analytical solutions of fracture propagation under ideal conditions.

- Hydraulic Fracturing Operations--Field Work. As the field manager, Ms. Okusu supervised personnel and coordinated equipment and data transfer on site. This work involved the data acquisition from pressure and flow sensors and the real-time use of the computer models to simulate fracture growth and reservoir performance.

PROFESSIONAL AFFILIATIONS

American Chemical Society
Society of American Military Engineers

SELECTED PUBLICATIONS AND PRESENTATIONS

Powels, C.C., Bon, I., and N.M. Okusu: "Innovative Cover System to Reduce Risks at a Chemical Munitions Burial Site," presented at the 1997 International Containment Technology Conference and Exhibition, St. Petersburg, FL, February 1997.

Okusu, N.M., Cerar, R.J., and Kerpen, H.-U.: "Remedial Investigation, Feasibility Study, and Remedial Design at the Milan Army Ammunition Plant," presented at Rustungsaltlasten, Umweltinstitut, Offenbach, Germany, February 1996.

Okusu, N.M., Cerar, R.J., and M.W. Sydow: "Overcoming Obstacles to Complete a Remedial Design and Construction Award," presented at the 1994 Federal Environmental Restoration Conference and Exhibition, New Orleans, LA, April 1994.

Hanson, K.E., Cerar, R.J., and N.M. Okusu: "Aquifer Testing and the Use of Results in Extraction System Design," presented at the 1993 Federal Environmental Restoration Conference and Exhibition, Washington DC, April 1993.

Okusu, N.M. and R.B. Isaac: "Remedial Investigation of the Milan Army Ammunition Plant," presented at the 1992 Federal Environmental Restoration Conference and Exhibition, Vienna, VA, April 1992.

Okusu, N.M., Palestini, A.C., and C.Y. Kuo: "The Use of a Groundwater Flow and Contaminant Transport Model in the Investigation and Remediation of the Saunders Supply Company Superfund Site, Chuckatuck, Virginia," presented at the Eighth Annual Virginia Waste Management Conference, Richmond, VA, April 1990.

Okusu, N.M. and K.S. Udell: "Immiscible Displacement in Porous Media Including Gravity and Capillary Forces," presented at the Winter Annual Meeting of the American Society of Mechanical Engineers, San Francisco, CA, December 1989, published in <u>Multiphase Transport in Porous Media - 1989 Symposium Proceedings</u>.

Okusu, N.M., Karasaki, K., and G.S. Bodvarsson: "A New Grid Generator for Calculating Flow and Transport in Naturally Fractured Rocks," presented at the 32nd Annual Meeting of the Association of Engineering Geologists, Vail, CO, October 1989.

Okusu, N.M., Karasaki, K., Long, J.C.S., and G.S. Bodvarsson: "FMMG: A Program for Discretizing Two-Dimensional Fracture/Matrix Systems. Theory, Design, and User's Manual," Lawrence Berkeley Laboratory Report LBL-26782, April 1989.

Okusu, N.M., Udell, K.S., and S.-C. Neoh: "A Mechanistic Model of Foam Displacement in Porous Media," presented at the Society of Petroleum Engineers California Regional Meeting, abstract published in <u>Proceedings of the Society of Petroleum Engineers California Regional Meeting</u>, Bakersfield, CA, April 1989.

Gaulke, S.W., Bodvarsson, G.S., Doughty, C., Aquino, B., Okusu, N., Halfman, S., and M.

Ripperda: "A Reservoir Analysis of The Geysers Geothermal Field, A Report to the California State Lands Commission," Lawrence Berkeley Laboratory Report, March 1989.

Okusu, N.M., and K.S. Udell: "Immiscible Displacement in Porous Media Including Gravity and Capillary Forces," presented at the American Geophysical Union Fall Meeting, San Francisco, CA, December 1988, abstract published in EOS Transactions, December, 1988.

Okusu, N.M., Zimmerman, R.W., Bodvarsson, G.S., Karasaki, K., and J.C.S. Long: "Models of Unsaturated Flow in a Fractured Porous Medium," presented at Workshop IV on Flow and Transport Through Unsaturated Fractured Rock as Related to a High-Level Radioactive Waste Repository, Tucson, AZ, December 1988.

Crockett, A.R., Okusu, N.M., and M.P. Cleary: "A Complete Integrated Model for Design and Real-Time Analysis of Hydraulic Fracturing Operations," SPE 15069, Proceedings of the Society of Petroleum Engineers California Regional Meeting, Oakland, CA, April 1986.

Okusu, N.M., Keck, R.G., and M.P. Cleary: "Development of Computer Models For the Pressure Distribution in Tubular Goods," Massachusetts Institute of Technology Report No. REL-83-12, September 1983.

EMPLOYMENT HISTORY

1984-1986	Project Engineer; Resources Engineering Systems, Inc.; Burlington, MA.
1986-1988	Research Assistant and Research Associate; Lawrence Berkeley National Laboratory; Berkeley, CA.
1988-1990	Environmental Engineer; Department of Waste Management, Commonwealth of Virginia; Richmond, VA.
1990-1999	Associate through Group Vice President; ICF Kaiser Engineers, Inc.; Fairfax, VA; Abingdon, MD; Savannah, GA; and Edgewood, MD.
1999 to present	Program Manager; IT Corporation; Oakland, CA and Concord, CA.

BRUCE HAYMAKER
1224 Ulfinian Way MARTINEZ, CA 94553, (925) 335-9386

EMPLOYMENT HISTORY

Environmental Scientist/Specialist, The IT Corporation/ICF Kaiser Inc., Oakland, CA, 1997-present. Compliance Program Manager for various Environmental Programs including: Stormwater, Wastewater, Hazardous Waste, Hazardous Material, UST, Pesticide, and Lead Based Paint.

Supervisory Environmental Protection Specialist, Subase Pearl Harbor, HI, 1995-96. Supervised and Managed a staff of 15 specialists and waste handlers in the processing of Hazardous Waste at Subase per RCRA Regulations.

Environmental Compliance Specialist, Mare Island Naval Shipyard, CA, 1992-95. Assured Compliance to Environmental Programs at the Shipyard by auditing and inspection of the industrial facility.

Physical Science Technician, Mare Island Naval Shipyard, CA, 1988-92. Performed Radiation Protection and Control duties for on board reactor related repairs.

Engineering Technician, Microphase Laboratories, Albuquerque, NM, 1986-88. Ran quality checks on materials and equipment, calibrations to increase productivity.

PROFESSIONAL SKILLS

TECHNICAL : Manage numerous Environmental Programs for Oakland Army Base to enable the Base to remain in compliance with applicable regulations, and provide technical support and guidance for their efficient and expedient transition through the closure process.

Supervised and Coordinated Hazardous Waste Program for Subase Pearl Harbor. Analyzed, Stored and Shipped waste per RCRA.

Assured compliance with federal, State, and local requirements through environmental audits and inspections of many areas of the Environmental Programs at Mare Island Naval Shipyard.

Prepared status reports of various environmental programs which included plans of action for environmental deficiencies.

ANALYTICAL: Conducted environmental audits for adherence to regulatory requirements, documented and analyzed deficiencies, and negotiated plans of action for correction of these problems.

Developed plans of action for environmental deficiencies and audit findings found during compliance evaluations.

Wrote protocols derived from laws, statutes, regulations, and directives in several software programs to check compliance with regulations.

EDUCATION

University of California at Davis, Certificate of Hazardous Materials Management, Davis, California, 1994.
Asbestos Contractor, supervisor, Project Manager, Designer Planner, Kellco, Hayward.
North Texas State University, B.A. Biology, Denton, Texas, 1975.
Current Certifications: HAZWOPER, DOT, HAZCOM

PERSONNEL QUALIFICATION VERIFICATION FORM

CANDIDATE: Reed, Michael

POSITION: Contractor Quality Control System Manager

CONTRACT: DACW05-96-D-0011 (TERC II)

REVIEW ITEMS		CANDIDATE QUALIFICATIONS	VERIFIED BY/DATE
EXPERIENCE & EDUCATION	REQUIRED: AREA AND YEARS	• Graduate engineer or a graduate of construction management, with a minimum of 4 years environmental engineering experience; or an experienced construction person with a minimum of 8 years experience in related work.	7.17.98
	ACTUAL: AREA AND YEARS	• B.S. Industrial and System Engineering, Georgia Institute of Technology, 1981; • 6 years environmental engineering experience.	
SUPPLEMENTARY EXPERIENCE & EDUCATION	REQUIRED	• 9 semester hours, 12 continuing education units (or combination thereof) education; and two years experience in specialized areas, e.g. RI, RD, & RA.	7.17.98
	ACTUAL	• 4 years field operations management, engineering & sampling supervision duties as Project Engineer and Director of Operations, for Browne, Vence, & Associates, and Acme Fill Company. • 40 hour OSHA HAZMAT and Emergency. Response training and refresher courses current. • RED Cross First Aid & CPR trained. • USACE sponsored Construction Quality Management for Contractors certification. • Engineering & construction cost estimating (Means method) while employed in civil service as Industrial Engineer at NAS JAX.	
CERTIFICATIONS, REGISTRATIONS, & TRAINING	REQUIRED	• Formal education and training in field sampling at HTRW sites • OSHA HAZMAT and Emergency Response certification	7.17.98
	ACTUAL	• One year at Pepsi, including analytical laboratory experience, and one year at Presidio, SF. • 8 hour OSHA HAZMAT and Emergency Response training session. • Trainer for all QC orientation, sampling process, handling and shipping, plus S&H orientation and training at Presidio HTRW operations.	
OTHER	REQUIRED	• Working knowledge of applicable federal, state, and local laws, regulations, and guidance.	7.17.98
	ACTUAL	• Knowledge of EPA, DTSC, Bay Area Water & Air Quality, county DHS, TSCA, OSHA and other regulatory requirements. See resume for additional details. • USACE Construction Quality Management for Contractors Training.	

Michael Reed

Professional Qualifications

Michael Reed is a degreed Industrial Engineer with more than 15 years of professional experience in environmental engineering and construction quality control, operations and facilities management, and general and engineering contracting. His project experience includes management of overall program quality control under the US Army Corps of Engineers TERC II contract, as well as project quality control management for environmental investigation and remediation at various US Army and National Park Service sites in the western US. Mr. Reed has also managed operations of a RCRA hazardous waste and municipal solid waste landfill, and managed permitting and regulatory compliance for hazardous waste operations.

Education

B.S. Industrial and Systems Engineering, Georgia Institute of Technology, 1981

Registrations/Certifications

USACE Certification of Construction Quality Management for Contractors
OSHA 40-hour HAZWOPER Safety Training, and 8-hour Refresher Safety Training (current)
OSHA 8-hour HAZWOPER & Emergency Response Supervisory Training
HM-126 DOT Hazardous Material Employee Regulations Training
First Aid and CPR Training (current)

Experience and Background

1999 – Present, Program Quality Control Supervisor, IT Corporation, Concord, CA. As the Program QC Supervisor for the SacTERC II contract with the US Army Corps of Engineers, Mr. Reed manages quality control for numerous task orders related to site environmental remediation. Management includes supervision of site QC managers. Mr. Reed is also site QC manager for Oakland Army Base, Tracy and Sharpe - Defense Distribution Centers, and various sites within the National Park Service system. Responsibilities include: Technical Planning Assurance; Verification of Qualifications and QC Indoctrination; Three-Phase Inspections; Daily Reporting; Document Review and Control of Submittals; Deficiency Tracking and Corrective Action; and, Project Close-Out.

1998 – 1999, Quality Assurance Specialist, ICF Kaiser Environmental Facilities Management Group (acquired by IT in 1999), Oakland, CA. Mr. Reed served as Quality Control Supervisor and Contractor Quality Control System Manager for the SacTERC II contract with ICF Kaiser prior to acquisition by IT.

1997 – 1998, Quality Control Engineer, Innovative Technical Solutions, Inc., Walnut Creek, CA. Mr. Reed served as quality control engineer and system manager for environmental remediation and construction at the Presidio of San Francisco under the USACE SacTERC I contract.

1996 – 1997, Quality Control Technician, Pepsi Cola Company, Hayward, CA. Mr. Reed was involved in start-up and operation of the $67 million bottling and distribution plant. Responsibilities included plant operation and trouble-shooting; regulatory compliance; and, reporting for environmental permit issues related to waste discharge.

1993 – 1995, Director of Operations, Acme Fill Corporation, Martinez, CA. Mr. Reed was responsible for managing staff of 30 in all aspects of solid waste landfill, transfer station and composting operations while maintaining regulatory compliance. He supervised all aspects of landfill closure engineering, construction, remediation and monitoring activities. Coordinated the development of $2 million landfill leachate extraction system and pretreatment plant. Guided efforts to permit, pilot test, construct and operate the 25-gallon per minute plant under order of the Regional Water Quality Control Board. Developed a profitable soil acceptance program. Reorganized purchasing methods and cost accounting system - reducing expenses by directing purchase authorizations, seeking competitive pricing from vendors and approving payables in time to eliminate finance charges. Developed, implemented and documented detailed employee safety training - achieving compliance with the Health and Safety Code.

1990 – 1993, Associate Engineer, Brown Vence & Associates, San Francisco, CA. Mr. Reed provided construction monitoring and operations management services for the solid waste and recycling industry. Designed and permitted material recovery facilities, solid waste transfer stations and composting facilities for public and private agencies.

1988 – 1990, Project Manager, Fowler & Associates, San Jose, CA. Served as Project Engineer for management of profitable construction projects as a general contractor. Projects included: design/build construction for aircraft paint removal buildings and equipment; construction of administration and shop buildings for a landfill; and, underground tank excavation and environmental remediation for private industry.

1983 – 1988, Industrial Engineer for Facilities Management, Naval Aviation Rework Facility, Naval Air Station, Jacksonville, FL. Mr. Reed provided facility engineering and project management for construction and equipment installation projects in support of Naval aircraft engine rework programs. Projects included: design and construction of facilities for installation of NC machining centers; and, construction of major military construction projects for centralization of aircraft engine rework support services. Position required coordination with engineering, building tenants, public works, facility maintenance, and contracts groups.

Susan X. Huang

Professional Qualifications

Ms. Huang has over 9 years of professional experience in combination of the data management and the air quality field, including data quality control and regulatory compliance. As a project chemist, she has worked on various projects under the Army Corp of Engineers Total Envrionmental Restoration Contract. She has reviewed project specific quality assurance plans, performed data validations, and authored quality control summary reports. She as acted as primary point of contact with contract laboratories, implemented corrective and preventive actions for analytical laboratory data quality issues and problems. As a chemical engineer, she has worked with a variety of industries, including petroleum refineries, food processing facilities, cogeneration plants, paper mills, and hospital waste incinerators. She has performed and managed compliance and engineering tests for criteria pollutants and air toxics emissions, prepared facility-wide emission inventories, conducted regulatory analyses, and prepared Clean Air Act Title V permit applications. Ms. Huang is familiar with the regulations and requirements of the U.S. EPA, California Air Resources Board (CARB) and various local air pollution control districts.

Education

B.S., Chemical Engineering, University of California, Berkeley, 1988
Additional training:
CARB 1-week Training: Fundamentals of Enforcement, 1995
CARB 1-week Training: Title V Permitting, 1995
CARB 3-day Training: Title III, Implementing Section 112 of Federal Clean Air Act in California, 1995
CARB Workshop: AB2588 Exemption Criteria, 1995
Feather River Air Pollution Control Workshops:
Measure from Cutback Asphalt Manufacturing, VOC Emission Control
Measure from Polyester Resin Operations, VOC Emission Control Measure from Waste Chemicals, and PM10 Emission Control
Measure for Residential Heat Stoves, 1995
29 CFR 1910.120 HAZWOPER 40-hour safety training course (July 1997) and refreshers
Hazardous Waste Operations and Emergency Response, August, 1996
EnviroMetrics Software Consultant Certification Class, April 1996
CAMEO Correspondence Course, National Safety Council, March, 1998

Experience and Background

2000 - Present
Engineer/Scientist, IT Corporation, Concord, California
Duties include:

- Review Quality Assurance Project Plans (QAPPs), Field Sampling Plans (FSPs), and Work Plans (WPs) for compliance with EPA Region 9 and federal facility requirements

- Review laboratory submissions, identify and resolve errors and omissions, conduct laboratory inspections, and prepare data quality reports.

1995 - 2000
Project Chemist, Harding Lawson Associates
Duties included:

- Provide technical expertise on QA/QC issues as an office-wide resource for chemistry-related matters in hazardous waste site investigations and groundwater monitoring programs

- Serve as the project chemist for diverse environmental investigations for the U. S. Army Corps of Engineers and commercial clients.

- Produce project-specific Quality Assurance Project Plans.

- Author project-specific data quality reports to assess overall precision, accuracy, completeness, comparability, and representativeness.

- Perform Level III and Level IV data validations for various EPA Analytical Methods.

- Implement, test, and conduct Automated Data Review for various EPA Analytical Methods.

- Commanding knowledge of SQL database, identify issues and solve problems, run queries and produce database reports.

- Act as a primary point of contact with contract laboratories regarding analytical laboratory performance and QA/QC issues.

- Identify QA/QC issues and make recommendations for corrective and preventive actions.

- Provide technical training and guidelines to colleagues.

Project Chemical Engineer

- Perform Title V permitting for aircraft maintenance facilities in California and various industries in Nevada.

- Prepare emission inventories for various industries to meet AB2588 regulations

- Conduct regulatory and compliance reviews including reviews of NESHAPs, NSPS, and local air district regulations.

- Perform modeling and risk assessment.

1994 - 1995
Feather River Air Quality Management District
Similar responsibilities as described above.

1992 - 1994
Project Manager Gerathy & Miller

- Conducted air emission testing for various industries.
- Validated testing and analytical results.
- Authored testing reports

1989 - 1992
Project Manager, Ecoserve, Inc.
Similar responsibilities as stated above

Representative Projects Experience:

Data Quality Management

Data Quality Management, Fort Ord NPL Project, Monterey, California – served as Data Quality Chemist for the Former Fort Ord Complex NPL project, reporting to the Program Chemist. Involved with investigations, studies, field work, remedial actions, and operation and maintenance projects. Participated in development of site- and project-specific data quality objectives and identification and selection of appropriate test methods. Prepared project-specific reports on data quality (i.e., quality control summary reports). Participated in preparation of sampling and analysis plans. Verified compliance with sampling and analysis plan and Chemical Data Quality Management Plan (CDQMP). Ensured compliance with subcontract laboratory scoping, costing and subcontracting agreements, and acted as primary point of contact with contract laboratory regarding analytical laboratory performance. Implemented corrective and preventive actions for analytical laboratory data quality issues and problems. Developed and maintained processes for collection, entry, retrieval, presentation, and archival of project data. Reviewed project data to assess overall quality, precision, accuracy, completeness, comparability, and representativeness of chemical data. Prepared site-specific data quality assessment reports which are incorporated in overall site characterization, etc. reports. Conducted project kick-off meetings with subcontract laboratories. Client: U.S. Army Corp of Engineers (USACE) Fort Ord NPL Project, Former Fort Ord Installation, Monterey, California

Data Management, various federal sites, California - Served as data quality chemist for other non-NPL projects (including Fort Hunter Liggett). Performed all duties as listed above for Fort Ord NPL Project. Client: U.S. Army Corps of Engineers.

Data Quality Management, California – Served a project chemist for various comercial clients and performed similar duties as listed above.

Emission Inventory

Air toxics emissions inventory, Beale Air Force Base, California - Identified and quantified air toxic and criteria pollutant emissions from paint booths, cold cleaners, vapor degreasers, boilers, turbines, and miscellaneous emission sources Developed a database that contained production data and Material Safety Data Sheets (MSDS) information for each product for all the emission sources. Client: Beale Air Force Base

Cogeneration facilities, Yuba, California - Identified emission sources and their pollutants, evaluated emission control devices, determined criteria, toxics, and fugitive emissions, and prepared emission inventories. Client: Yuba Cogeneration

Aggregate and asphalt facilities, Marysville, California - Identified emission sources, quantified criteria pollutants and fugitive emissions, and updated facility-wide emission inventories. Client: Marysville's Aggregate and Asphalt

Grain elevators, Marysville, California - Identified emission sources, evaluated emission control devices, calculated criteria pollutants and fugitive emissions, and updated facility-wide emission inventories. Client: Pacific Rice Mills

Petroleum refinery, Bakersfield, California - Evaluated process conditions and updated emission inventory report to comply with AB2588 regulations. Client: Unocal

Solid waste treatment plant, Palo Alto, California - Evaluated process conditions and prepared an updated emission inventory to meet requirements of AB2588 Client: City of Palo Alto

Title V Permitting

Title V Permitting, aircraft maintenance facilities, California - Identified emission sources including paint booths, cold cleaners, chrome plating tanks, vapor degreasers, fuel storage tanks, dry cleaners, turbines, and boilers. Calculated hazardous air emissions and criteria pollutant emissions using USEPA emission factors, source test data, continuous emission monitoring (CEM) data, and mass balance techniques. Performed compliance audits. Determined applicable federal, state, and local air district regulations and their requirements. Some applicable regulations consisted of National Emission Standards for Hazardous Air Pollutants (NESHAPs) for chrome plating tanks, cold cleaners and vapor degreasers, and New Source Performance Standards (NSPSs) for boilers and turbines. Developed a database that linked emission calculation methods, production data, and regulatory requirements to each emission source. Provided training for facility personnel to implement the database. Client: United Airlines

Title V Permitting, Las Vegas Paving, Nevada - Quantified criteria pollutant emissions from aggregate and asphalt plants. Performed regulatory and compliance review, including a review for asphalt NSPS. Identified applicable federal and Nevada state regulations and their requirements.

Prepared Title V permit application. Client: Las Vegas Paving

Title V Permitting, Environmental Technologies, Nevada - Quantified criteria pollutant emissions from material transferring devices, generators, and fuel storage tanks. Performed NSPS review for this sand and gravel facility. Identified applicable federal and Nevada state regulations and their requirements. Prepared Title V permit application. Client: Environmental Technologies

Title V Permitting, Silver State Disposal, Nevada - Quantified criteria pollutant emissions from landfill operations. Determined compliance with applicable federal and Nevada state regulations. Prepared Title V permit application. Client: Silver State Disposal.

Portable Equipment Registration, Chemical Lime, California - Quantified criteria pollutant emissions from lime mixing process. Prepared a portable equipment registration application per San Joaquin Valley Unified Air Pollution Control District permit requirements. Client: Chem Lime Corporation

Title V Permitting, cogeneration plant and sludge-drying plant, Martinez, California - Identified applicable federal, state, and local air pollution district regulations and their requirements, determined compliance with appropriate federal, state, and local district regulations, reviewed AB2588 Emission Inventory Plan and Report, updated emission inventory, and evaluated continuous emission monitoring performance. Client: Martinez Cogeneration

Title V permitting program, Marysville, California - Implemented the District's Title V permitting program, determined State Implementation status for District regulations, identified Title V sources, and assisted an Air Force base, two cogeneration facilities, and a natural gas processing facility with their Title V applications. Client: Feather River Air Quality Management District

Air Pollutant Emission Monitoring and Testing

Ambient air monitoring, Caltrans, California - Performed ambient vinyl chloride monitoring for highway construction activities. The site was previous occupied by a chemical facility and its soil was contaminated with vinyl chloride and other hydrocarbons. Vinyl chloride was monitored to ensure that the work environment for construction workers was safe. Client: Caltrans

Air pollution source testing, more than 50 facilities, California - Performed source testing at a variety of facilities throughout California. Facilities included food processing facilities, hospital waste incinerators, power plants, petroleum refineries, asphalt plants, paper mills, graphic arts and printing facilities, and landfill flares. Client: Numerous

AB2588 emission testing, California - Conducted and managed AB2588 emission testing. Prepared emission testing reports for petroleum refineries, food processing facilities, hospital waste incinerators, and cogeneration plants. Client: Numerous

Pollutant emission testing, California - Conducted and managed criteria pollutant emission testing and prepared emission testing reports for aggregate, asphalt facilities, and food processing facilities.

Client: Numerous

Continuous emission monitoring, Richmond, California - Conducted continuous emission monitoring testing. Determined compliance with U.S. EPA NSPS for cogeneration facilities. Client: Chevron U.S.A. Products Company

Engineering studies, California - Performed engineering studies to evaluate pollutant emission control device performance for cogeneration plants, landfill incinerators, and food processing facilities. Client: Numerous

Regulatory Compliance

Storm water pollution prevention plan and storm water monitoring plan, JSR Microelectronics, California - Prepared a Notice of Intent. Described operating activities for each stage of the production. Identified hazardous wastes, their storage locations, and their secondary containment. Provided site-specific storm water prevention methods. Developed inspection and monitoring programs. Client: JSR Microelectronics

Environmental Site Assessments, California - Prepared environmental site assessments for sites located in San Francisco, San Jose, and Santa Rosa. The assessments for these three sites consisted of reviewing aerial photos and regulatory agency databases, site inspections, interviewing facility personnel and regulatory personnel, and preparing reports. Client: Confidential

EPA section 114 Compliance, James Hardie Gypsum, Nevada - Prepared documents to comply with USEPA Section 114 requirements. Identified emission sources and abatement devices/or emission control practices. Reviewed operating permits, authority to construct, source testing reports, and applicable state and USEPA regulations and their requirements. Identified out-of-compliance issues, established compliance plans and schedule. Client: James Hardie Gypsum

Modeling and Risk Assessment

Benzene modeling, Calgon Carbon, California - Performed screen and ISCST2 modeling, and risk assessment to evaluate benzene concentrations for a carbon regeneration process modification. The modeling results were used to demonstrate that benzene concentrations did not pose a health risk to the surrounding areas as a result of the process modification. Client: Calgon Carbon

Lead modeling, California - Performed ISCST3 modeling to evaluate lead concentrations from lead-melting process. Client: Confidential

ATTACHMENT C

PROJECT SUBMITTAL REGISTER

(Submitted under separate cover)